Utah Framework Implementation Plan
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VERSION 4/16/2001

NSDI Implementation in Utah

Introduction

The OMB Information Initiative to align the needs and resources to continue to develop the National Spatial Data Infrastructure provides public and private agencies in Utah an opportunity to focus on mutually beneficial partnerships. The results of these efforts will help to provide integrated information for analysis of issues and decision-making at federal, state, local, and Tribal levels of government. Further it will provide a common frame of reference for communicating information and concepts of complex issues to citizens.

Overview of the Plan

This Implementation Plan identifies the organizational structure of the Implementation Team for Utah, defines a process based on planning and policy issues for prioritizing data themes that will contribute to building the NSDI, and provides a summary of eighteen data themes that will be included in the prioritization process

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Jurisdiction

This plan addresses issues and information needs statewide for Utah and reflects the collaboration of federal and state agencies and representatives of local and Tribal governments.

Implementation Team

The Geographic Information Systems Advisory Council (GISAC) has led the statewide GIS data coordination efforts in Utah. GISAC membership encompasses federal agencies, state agencies, local government, Native American Tribes, academia, and private sector participants. GISAC has met and agreed to serve as the Implementation Team for Utah. Members of GISAC, in addition to other agency participants have been identified to participate in the Implementation Team (Appendix 3: Membership List*)*. Subcommittee working groups of GISAC typically address specific joint projects. It is proposed that this subcommittee working group structure be used for each framework layer and state defined theme to develop and implement the plan for that data layer (Section 3: Subcommittee participation). Within this structure, a federal champion would be identified for each theme as requested by OMB. Representatives from county government (Appendix 3) and Tribal government (Appendix 3) will also be invited to participate to the extent and at the level they are interested in. The Financial Team liaison is the Chair of the GISAC. GISAC meets monthly and will report to the FGDC annually or as needed.

GISAC Track Record. GISAC has successfully coordinated similar efforts under the Framework Demonstration Project Program (FDPP) and Competitive Cooperative Agreements Program (CCAP); has led multi-participant Joint Funding and Innovative Partnership projects, and administered funding programs appropriated by both the State Legislature and the U.S. Congress. Through GISAC, a strong partnership environment exists in Utah.

> The mission of GISAC is to "recommend GIS policy and standards, encourage GIS use and education, and promote data collection, integration and dissemination among all GIS users. Collectively, these activities promote increased productivity, better decisions, and improved services to customers".

The Implementation Team is built on the foundation of cooperation developed over the last decade; these relationships were formalized in October of 1997. The State of Utah and nine federal agencies signed a Memorandum of Understanding for the Utah Digital Spatial Data Sharing and Integration Project (Appendix 1). The purpose of this MOU is for sharing and exchanging non-sensitive digital spatial information in the State of Utah. Under this agreement an online catalog of the data (SGID--State Geographic Information Database) is maintained by the Automated Geographic Reference Center (AGRC). AGRC is a NSDI clearinghouse node.

Approach

Framework Layers. The Implementation Team has defined 18 priority data themes. These include the seven framework themes defined by the FGDC, an additional eleven layers were defined by the 1997 MOU (8 layers) and by subsequent agency needs (3 layers). A listing of these layers is provided in Section 3 of this plan.

Selected priority layers currently are assigned to work groups. Where funding has been identified and work is already in progress, this work will be documented in the inventory process and will continue unimpeded and accelerated where possible. In cases where funding has not been identified, these layers will be included in the prioritization within the scope of the plan.

Process. For each framework layer a subcommittee work group (Section 3) will be identified. Each work group will represent agencies having mandated responsibility and/or programmatic need for the data. Each group will coordinate completion of the following:

- Inventory of the existing data and provide a status report
- Develop costs estimate and time requirements for completion of the data layer
- Describe how investment has been leveraged to provide data for multiple uses
- Identify standards and document
- Develop a strategy for completing the data layer
- Assign responsibility for creation, integration, and maintenance of the data layer
- Provide data access through the SGID or agency based web sites

Prioritization of Framework Layers. GISAC is in the process of identifying the driving issues for each level of government. An initial list of issues is discussed in Section 2 of this plan; however, a more comprehensive analysis of the issues and identification of overlapping information needs will addressed in future meetings. We anticipate this will be an iterative process and issues can be revised regularly. Also, some agencies may require additional time for their management to prioritize issues. As the issue analysis is completed, the matrix in Section 3 will be updated to reflect priority issues and identify the framework layers that are needed to address each issue. As shown on the Issues/ Data matrix in Section 3, framework layers are needed to address most

issues, so it is anticipated that even as issues change, many of the data requirements will not change. It is anticipated that some layers may receive higher priority from time to time and some areas of the state may receive higher priority than others but this flexibility will be workable through the plan.

Budget and schedule. GISAC meets monthly. It is planned to place I-Team issues on their agenda as needed, but at least quarterly. Those quarterly meetings will result in a report that describes progress, identified needs, and alterations to the Implementation Plan. GISAC will begin immediately to identify funding sources to fulfill needs and to enhance collaborative efforts to secure resources needed to fully implement the Plan.

I-Team Principles. The principles followed by the Utah I-Team are based upon the following policy statements which have been adopted by GISAC.

- Most data should be created and kept current by agencies that have a programmatic need or mandated responsibility for specific layers.

- Because users close to the geographic features usually have first hand knowledge of the data and can provide more accurate and timely data, local governments should be encouraged to create and share data.

- Coordination of state, local, and federal data development and sharing efforts should continue as a state led activity through the GISAC and it's partnership with the FGDC.

- There will always be a number of "framework" base layers or critical and common thematic layers (identified by GISAC) that will require funded creation and centralized maintenance.

- The integration of differing data within and among themes should remain a centralized function of the State Geographic Information Database.

Standards. The GISAC and the State of Utah have adopted the FGDC metadata standards as the standard for the State Geographic Information Database. Data standards for the framework themes and critical layers will be developed jointly by the creation agencies if national standards do not currently exist. Each layer will have documented standards. These and other standards are intended to achieve coordination and interoperability.

Driving Issues

Governor=s Message on State Priorities

The State of Utah now has 2.1 million people and is growing at twice the national rate. The state=s economy has made a smooth transition from the boom or near-boom conditions it experienced during much of the 1990s and remains very well poised to continue to prosper. The 2002 Olympic Winter Games are now just under a year away and the State is well primed to host the world having invested millions of dollars in highways, rail transit, digital infrastructure, housing, and winter sports venues.

Growth in all of its forms remains the dominant issue facing the state. Population, job, and income growth rates in Utah continue to outpace those of the nation. In the last eight years, 250,000 net new jobs have been created, approximately one in every four that exists today. Managing this growth in a way which preserves Utah=s enviable quality of life is a primary focus of Governor Leavitt. Through his leadership the state is pro-actively investing in Utah=s future.

The Governor has focused the state=s resources towards the realization of three general goals:

- X Improve the quality of education
- X Provide a strong economy and more quality jobs
- X Improve Utahn=s quality of life

The fulfillment of these goals requires careful planning, investment, and purposeful action. Accordingly, state government is focusing its energies on education funding; economic development; and, quality of life issues such as transportation congestion, environmental quality, crime and safety, health care, and human services. The National Spatial Data Infrastructure project is an important part of addressing the priorities of the Governor as they relate to growth, health and safety, and quality of life.

> *Utah=s prospects have never been brighter. My aim is to seize the moment, maximize the opportunity and turn up the wattage even higher.*
>
> B Governor Michael Leavitt

Driving Issues

The 2002 Winter Olympics are under a year away. Several of Utah’s counties are among the fastest growing in the country and open space, including prime farm land, is disappearing at an alarming rate. The Wasatch Front is one of the most susceptible areas in the nation to earthquakes. Nearly seventy percent of Utah is administered by the government and much of it is off limits to sustainable rural development efforts. Citizens living in the state as well as all across

the nation are concerned about the wise use of Utah's natural resources and public lands.

Public Officials in Utah concentrate on issues facing the state and its local subdivisions daily. They must analyze information and make decisions that affect citizens and the environment of the State. Having the best available information easily accessible by these decision makers is critical.

Required Data:

The Utah Framework Implementation Team (I-Team), working with the agencies they represent, identified many of the State's most serious issues. The I-Team then determined which data themes are required to successfully address each issue. This analysis is summarized in the table below. The first three issues in the table, represent the Governor's top priorities.

UTAH ISSUES	**PRIORITY DATA LAYERS** Geodetic Control	Digital Ortho-Imagery	Elevation	Transportation	Hydrography	Boundaries	Cadastral	Demographics	Wetlands	Geology	Wildlife habitat	Climate	Ground Cover	Land Use	Soils	Telecommunications	Critical facilities/Infrastructure	Environmental
Economic Development	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Education / Enrollment	X			X		X	X	X						X		X		X
EGOV Service Delivery	X	X	X	X	X	X	X	X								X		
Olympics	X	X	X	X	X	X	X	X	X			X		X		X	X	X
Rural Economies	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Quality Growth	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hazardous/Nuclear Waste	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X
Open Space/Agriculture	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X
Environmental Protection	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X
Emergency Management	X	X	X	X	X	X	X	X		X						X	X	X
Public Lands Management	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Law Enforcement	X	X	X	X		X	X	X								X	X	
Traffic/Transportation	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X
Redistricting / Census	X	X		X		X	X	X								X	X	
Epidemiology/ Health Care	X	X		X		X	X	X								X	X	X
Social Services	X	X		X		X	X	X								X	X	
E911	X	X	X	X	X	X	X	X								X	X	

Priority Data Layers and Responsible Agencies / Individuals

FRAMEWORK THEMES DEFINED BY FGDC:

1) Geodetic Control
    NGS, David Minkel
    Utah Association of County Surveyors, Vaughn Butler
2) Digital Ortho-Imagery
    USGS, Dave Vincent
    Forest Service, Joe Calderwood
3) Elevation
    USGS, Dave Vincent
4) Transportation
    Census, Jim Castagneri, Joe Marinucci, Randy Fusaro
    UDOT, Chris Glazier
    AGRC, Dennis Goreham
    Counties, GIS Coordinators
    USGS, David Vincent, Lee Aggers
    FS, Joe Calderwood
    BLM, Jerry Sempek
    USDOT, ?
5) Hydrography
    5A) National Hydro Dataset
        USGS, Dave Vincent
        FS, Michelle Huffman
        AGRC, Cindy Clark
    5B) Hydrologic Sub-basin Boundaries
        USGS, Karen Hanson
        NRCS, Bob Sennett
        FS, Michelle Huffman
        BLM, Jerry Sempek
        AGRC, Cindy Clark
        DEQ, Mark Stanger
6) Boundaries
    Census, Jim Castagneri, Joe Marinucci, Randy Fusaro
    Tax Commission, Finch Bingham
    AGRC, Matt Peters, Cindy Clark
    BLM, Don Gray
7) Cadastral
    7A) Public Land Survey System
        BLM, Sandy Lewis, Don Gray

FS, Val Schultz
AGRC, Bob Nagel
Counties, Surveyors

7B) Administrative Ownership
SITLA, Gen Green
Counties, Recorders
AGRC, Bob Nagel, Gordon Douglass
BLM, Dan Webb
FS, Steve Dodds

DATA SHARING MOU DEFINED THEMES:

8) Demographics
Census, Jim Castagneri
GOPB, Lisa Hillman
AGRC, Cindy Clark, Bob Nagel

9) Wetlands
FWS, Diana Wittington, Chuck Elliott
EPA, Karl Herman
NRCS, Bob Sennett
ACofE, Scott Stoddard
DNR, Lloyd Johnson
AGRC, Cindy Clark

10) Geology
10A) Surface Exposures
UGS, Rick Allis, Grant Willis, Bill Case
USGS, ?
AGRC, Janine Jarva

10B) Hazards
UGS, Rick Allis, Gary Christenson, Bill Case
USGS, ?
AGRC, Janine Jarva

10C) Resources
UGS, Rick Allis, Dave Tabet, Bill Case
USGS, ?
AGRC, Janine Jarva

11) Wildlife Habitat
DNR/DWR, Michael Canning
GAP, Doug Ramsey, Utah State University

12) Climate
Utah Climate Center, Dr. Donald T. Jensen
AGRC, Debbie Alder

13) Ground Cover
FS, Roberta Quigley, Jack McDonald

BLM, Dan Webb,
USGS, Dave Vincent
EPA, Karl Herman
USU, Doug Ramsey

14) Land Use
USGS, Lee Aggers
GOPB, Scott Frisby
Counties, Planning and Zoning
DNR/DWR, Eric Edgely
NRCS, Ray Grow & Bill Broderson (NRI Database)

15) Soils
NRCS, Bill Broderson
FS, Pete Kilbourne, Jack McDonald
BLM, Larry Maxfield

ADDITIONAL THEMES IDENTIFIED:

16) Telecommunications Infrastructure
CIO, Jeannie Watanabe
AGRC, Debbie Alder
ITS, Douglas Chandler
UEN, George Brown
Rural Partnership Board, Wes Curtis
Rural Telecom Assoc., Nancy Gibbs
Qwest, Michael Dalebout

17) Critical Facilities / Infrastructure
CEM, David Buell, Joe Fletcher
FEMA,

18) Environmental Hazards
DEQ, Ken Elliott
AGRC, Joe Borgione
EPA, Karl Herman
FS, Suzanne Buntrock

Budget and Schedule Summary

The I-Team considered a variety of options for determining priorities for funding and scheduling. We discussed setting priorities based on whether a theme was necessary to address multiple issues identified in Section 2. Designating the seven FGDC framework layers as the top priorities was another option. We also recognized that priorities could be based on funding opportunities, that is, if funding is currently available for a given theme, should it be a priority. After considerable discussion, the team agreed to the following criteria:

1) Theme is a priority to your agency.
2) Theme is moderately important to your agency.
3) Theme is least important to your agency.

In this way, each I-Team member could best answer for their own agency and each member submitted their agency priorities. These agency-based recommendations were then consolidated into the priority column in the table below.

Theme Type	Priority (1 – 3)	Time Frame	1st Year Cost	Total Cost
Geodetic Control	1	?	?	$4,900.000
DOQs	1	10 years	$803,200	$4,928,000
Elevation	1	1 year	$460,230	$460,230
Transportation	1	3 years	$2,000,000	$5,370,950
Hydrography	1	5 years	$590,400	$2,678,968
Boundaries	1	?	?	?
Cadastral	1	10 years	$500,000	$5,600,000
Demographics	2	Ongoing	$125,000	Ongoing
Wetlands	1	?	?	$2,763,000
Geology	1	110 years	$306,000	$73,068,000
Wildlife Habitat	2	2 years	$100,000	$200,000
Climate	2	?	?	$269,000
Ground Cover	1	?	?	?
Land Use	1	?	?	$7,000,000
Soils	1	20 + years	$600,000	$18,750,000
Telecommunications	2	1 year	$10,000	$10,000
Critical Facilities	2	2 years	$75,000	$150,000
Environmental	2	?	?	?

Theme Summaries

Geodetic Control

To provide adequate geodetic control for the survey community in Utah, a high order station is needed at a minimum, although somewhat sparse, spacing of every twenty four miles. More stations are required in populated areas. These stations should be coincident with PLSS township corners. There are 2565 townships in Utah and a station is required at least every four townships. We estimate that approximately 700 stations need to be established. These average $7,000 per station for a total cost of $4,900,000.

Digital Ortho-Imagery

$147,000 is required to complete the first generation coverage of Digital Orthophoto Quads (DOQs) for the state. Approximately one half of these were done from photography flown in 1993. At least for the high growth areas, plans are underway to begin second generation DOQs. These will cost $800.00 per quarter quad. Complete coverage of second generation DOQs for the State would cost approximately $4,928,000. The I-Team has discussed a revision cycle of ten years and has began to identify critical areas for new DOQs this year. An estimated $803,200.00 is required for second-generation coverage for the priority areas in Utah based either upon coverage for urban growth areas or replacement DOQs for older National High Altitude Aerial Photography (NAPP). The I-Team will begin to identify the most critical areas this year.

Elevation

An estimated $460,230.00 is required to complete once-over state coverage for 10-meter DEMs. Estimate based on the current cost of $690 to produce one 10-meter DEM for the remaining 667 7.5-minute quadrangles in the state.

Transportation

Currently, nearly 50% percent of the roads in Utah have been GPSed, nearly 25% have been attributed, and about 10% have been QA/QCed. To complete this process another $5,000,000 ($100/per mile X 50,000 miles remaining) is needed. From that complete comprehensive framework database, the DLGs can be updated at a total cost of $320,950 (917 quads X $350 per quad). Also, UDOT will be able to finalize the State transportation network for state and federal routes for another $50,000.

Hydrography

Hydrologic Sub-basin Boundaries:
An estimated $129,200.00 is required to complete delineation for the remaining 38 sub-basin boundaries encompassing Utah and the surrounding states. Based on the current estimated cost

of $3,400.00 for each sub-basin boundary delineation. This estimated cost also includes the delineation for the interior watershed and sub-watershed boundaries.

National Hydrography Dataset:
To complete the 1:24,000-scale revision process for the State of Utah will cost $2,549,768.00 based upon the following estimates (for the remaining quads within the state):

1,028 quads revised @ $785/quad =	$806,980.00
1,203 quads high-res NHD (58 sub-basins) @ $527/quad =	633,981.00
2,231 QA/QC revision and high-res NHD @ $497/quad =	1,108,807.00
Total Cost =	$2,549,768.00

Costs per quad are an average of a 4% increase per year, figured for a five year projected completion. An additional $1,443,612.00 will be required to revise the Digital Line Graph (DLG) and FS Cartographic Feature File (CFF) data, do high-resolution NHD, and QA/QC the quadrangles in the adjacent states for those 38 sub-basins that fall over Utah's border. To accomplish this it will be necessary to enter into cost share partnerships with the surrounding states.

Boundaries

Costs for the boundaries theme are yet to be determined.

Cadastral

To complete a Cadastral layer for the State of Utah, an estimated total of $5,600,000 will be required. Of this, the first-year cost is estimated at approximately $500,000. This figure represents varying degrees of work for the 2,565 townships in Utah, and does not include the ongoing Operations and Management (maintenance) necessary to keep the layer current. Approximately 305 townships have been validated, leaving 2,260 that need collection, correction, and validation. The above figure entails collection of existing corner data at all levels of government, and the collection of new corner data, all to the standards specified later in this document. These data sets will pass through the BLM's GCDB toolset, before being integrated into the statewide layer.

Demographics

Currently, there are three FTEs working full time on this theme at GOPB for an annual cost of approximately $125,000. This is the amount required annually to maintain this theme.

Wetlands

It has been determined that it would cost $2,763,000 to complete a statewide digital wetlands data set. This would include completion of photo-interpretation, draft and hardcopy map

production, digitizing quads, and the QA/QC process. Upon the completion of these steps, the data would be submitted to NWI for certification and integration into the NWI database.

Geology

UGS has expended $850,000 ($500,000 on surface maps, $200,000 on hazards, and $150,000 on resources) in the past five years since the effort to complete the Geology theme began.

$72,204,000 will be required to complete the geology theme and an additional $30,000/year will be required for update and maintenance of this theme (this figure will increase with time as the number of maps in the theme increases).

$4,568,000 and 15 years will be required to complete all 1:100,000-scale surface geologic maps in GIS format (assuming 5 FTE geologists and 1.5 FTE GIS specialists). $67,990,000 and 110 years will be required to complete all 1:24,000-scale surface geologic maps in GIS format (assuming 5 FTE geologists and 1.5 FTE GIS specialists). $180,000 and three years will be required to complete all current and published geologic hazard maps in GIS format (assuming 1.5 FTE GIS specialists). $330,000 and eleven years will be required to complete all current and published geologic resource maps in GIS format (assuming 2 FTE geologists and 1 FTE GIS specialist).

Wildlife

The Utah Division of Wildlife Resources maintains GIS themes for wildlife species locality data and wildlife species habitat data. Although there is currently adequate funding to update and maintain the wildlife species locality themes, approximately $200,000 is needed to update the wildlife species habitat themes. Both types of wildlife themes are designated as Apriority data layers", as they are used for impact analysis, management, research, and planning.

Climate

A quite firm estimate to create the 1971-2000 thematic layers is: $3,000 to organize and set up the data for each layer, and $2,000 for the mapping of each layer for each year and month. For example, for temperatures there would be a $3,000 set up cost, and then an additional $2,000 for each of the maximum, minimum and average temperature maps created. These combinations are required to meet users needs. The total cost would be $269,000.

Ground Cover

No information currently available.

Land Use

Creation of a statewide land use them is a priority. To have complete coverage of high-resolution

LULC data for Utah would cost approximately $7 million. This is based on an average cost of $4,500 per quad for the LULC multiplied by the 1,542 1:24,000-scale quadrangles that cover Utah. The contributions to create and maintain this coverage need to be combined from a number of sources.

Soils

Approximately 15 million acres of soils remain to be initially mapped, to have mapping updated, data sets built, and certified before inclusion in Utah's SSURGO Data Base. Estimated costs to complete the detailed soil survey and develop a SSURGO Data Base theme is about 18.75 million dollars. The funding for NRCS allows for about 10 soil scientists and this is expected to continue. Soil Scientist funding for progress soil survey averages about 40,000 acres per person per year or 400,000 acres. The total estimated allocation of funds for the 400,000 acre per year goal for soil survey is about $500,000 for mapping; $50,000 for correlation, data quality review, and lab data; and about $50,000 for map materials, compilation, and digitizing. This total is about $600,000 annually to support soil survey mapping and SSURGO Data Base development at its present level.

Telecommunications Infrastructure

Some digital data remains to be developed. All data distributed for this theme must be documented using the FGDC National Metadata Standard. The CIO's office and AGRC will coordinate development and implementation of minimum attribute standards for these themes.

Critical Facilities / Infrastructure

Most of the themes in this section are complete with just maintenance required to reflect current conditions. The water distribution system theme requires the most work of any in this section. There are approximately forty Water Districts in the State. We will contact each of them to get the most current and accurate information. One and ½ FTEs are needed to complete and maintain this activity.

Environmental Hazards

No information currently available.

Geodetic Control

Theme Description:

Geodetic control is the common basis for referencing other features to the earth's surface relying on nationally used horizontal and vertical coordinate datums. The National Research Council recognized the importance of this layer when it published the "Need For A Multipurpose Cadastre" in 1980. It reported that "A survey control base is needed to create an integrated land records and information system. Monumented points whose coordinates have been determined with respect to the national geodetic control system constitutes such a system. This system permits spatial reference of all land data to identifiable points on the earth's surface**".**

Data Sources:

The primary source for geodetic data is the National Geodetic Survey (NGS). NGS, known by other agency names in the past, has been responsible for establishing and maintaining a nation-wide geodetic control network since 1807. This network, currently called the National Spatial Reference System (NSRS), contains monumented survey stations whose horizontal and/or vertical coordinates are precisely known. In the past NGS was the only agency establishing, maintaining, and publishing high accuracy geodetic control. Due to the nature of the surveying technologies most horizontal control was on mountain peaks, and vertical control followed roads and railroads. The US Geological Survey, to support their mapping efforts would come off the NGS control and survey down to the area of interest using lower accuracy procedures and instruments, but adequate for USGS mapping. Therefore, many geodetic survey stations established 30 or more years ago are considered inaccessible by today's surveyors or inappropriate for using GPS technology. The control network continues to diminish in size as stations are destroyed due to construction and vandalism**.**

Map 1, at the end of this section, depicts the Federal Base Network (FBN) for Utah. The FBN is a subset of the approximately 7500 geodetic control stations that comprise the NSRS in Utah. NGS policy is that only FBN will be maintained by NGS, the remaining stations of the NSRS are the responsibility of local entities. The rationale is that the FBN stations, by having extremely accurate positions, can be used by local surveying entities to effectively establish new stations or re-establish NSRS stations using GPS techniques.

With the advent of modern technologies such as GPS and bar code leveling instruments, many state, local and Tribal government agencies have undertaken to establish geodetic control. Data submitted to NGS that comply with standards and specifications are incorporated into the NSRS. Many entities elect to not submit their data to the NGS but will provide those data upon request, while some entities will not provide those data outside the agency. The NSRS is made available

free of charge by NGS through direct Internet access; other methods (CDs, paper products, etc.) incur a cost of dissemination.

State Statue requires licensed surveyors in Utah to file with the County Surveyor, geodetic control they establish. County Surveyors establish and publish geodetic control within their own jurisdictions and in conjunction with NG**S.**

Status:

The status of geodetic control varies with the value and development of the land. Remote and sparsely populated areas seem to survive with little geodetic control or local surveying entities establish control as needed on a project-by-project basis. Areas of high population density require a much higher density of control.

The most aggressive efforts to densify geodetic control are along the Wasatch Front where most of the state=s population resides and land development flourishes. County Surveyors are establishing high accuracy control stations to perpetuate the positioning of the Public Land Survey Systems (PLSS). A high accuracy network can be efficiently used for Real-Time Kinematic (RTK) GPS surveying and traditional methods. RTK is very efficient for cadastral survey, stake out survey, and as-built surveying of infrastructure (pipelines, fiber optic cable, etc.). Geodetic positioning of all corners will bring the PLSS into a coordinate system at centimeter level of accuracy, using RTK techniques**.**

Standards:

Standards for both the establishment of geodetic control and for data transfers are well documented. See Geospatial Positioning Accuracy Standards (FGDC-STD-007-1998) and Spatial Data Transfer Standard (SDTS), Part 6: Point Profile (FGDC-STD-002.6).

Priority:

The geodetic control layer is of very high priority for surveying and mapping in Utah. The rationale being that if geodetic control is readily available throughout the state, all geospatial data will be brought into a common coordinate system at the time the data are collected. This is especially important in developing an integrated cadastre.

Since geodetic control is a fundamental infrastructure for geo-spatial analysis activities, the higher the interest level in a geographic area, the higher the priority for good geodetic control. In remote areas, where small scale mapping is used, the existent NSRS may be adequate. In urbanized areas or areas undergoing significant development, large scale mapping is recommended and the existent NSRS might not be adequate.

Due to resource constraints, the establishing of geodetic control is usually done on a project-by-project basis. Geodetic control might have been used to collect data in an area had the control been there initially**.**

Total Current Investment in Theme:

The total investment to date by federal, state, and local entities is significant but the amount is not currently available.

Contributions by Sector:

Unknown.

Estimate of Investments Needed to complete This Item:

To provide adequate geodetic control for the survey community in Utah, a high order station is needed at a minimum, although somewhat sparse, spacing of every twenty four miles. More stations are required in populated areas. These stations should be coincident with PLSS township corners. There are 2565 townships in Utah and a station is required at least every four townships. We estimate that approximately 700 stations need to be established. These average $7,000 per station for a total cost of $4,900,000.

Estimate of Current Allocation of Funding for This Theme:

Other than what is spent on an occasional corner set by a County Surveyor on the Wasatch front, there is no funding currently available. There must be a coordinated effort created between NGS, state agencies and local agencies to accomplish the goal described above.

Describe Ways to Fund This Gap:

State and national appropriations.

Most Appropriate Data Steward:

We foresee sharing this responsibility between NGS, the State of Utah (AGRC**),** Bureau of Land Management (BLM) and the County Surveyor=s**.** NGS, through its existent on-line database will remain responsible for the NSRS. However, AGRC is establishing a clearinghouse for the distribution of geodetic data. This clearinghouse will also mirror the data provided by NGS resulting in a single source of geodetic control for local surveyors. All state, local, and private agencies that establish geodetic control will be invited to participate.

Maintenance Process and Cost:

Unknown at this time.

Digital Ortho-Imagery

Theme Description:

The FGDC "Framework Introduction and Guide" explains that "Orthoimagery provides a positionally correct image of the earth. An orthoimage is a georeferenced image prepared from an aerial photograph or other remotely sensed data from which displacements of images caused by sensor orientation and terrain relief have been removed."1

Digital orthoimagery is typically utilized in a digital orthophoto format. A digital orthophoto is a georeferenced image that has the properties of an orthographic projection – positionally correct image of the earth – composed of an array of georeferenced pixels that encode ground reflectance as a discrete digital value. The orthophoto combines the image characteristics of a photograph with the geometric qualities of a map.2

This dataset can be utilized to derive and compile many geographic features that are part of the framework for utilization in Geographic Information System (GIS) applications. In particular, numerous vector data themes can be compiled from digital orthoimagery. The dataset can also be used to analyze or reference other data and to update older data based on the visible features on the digital orthoimagery. Change detection is another use of this data.

Data Sources:

There are various datasets for digital orthoimagery. The U.S. Geological Survey (USGS) compiles and produces a standard digital orthoimage in 1-meter ground resolution quarter quadrangles (1:12,000-scale, 3.75- x 3.75-minute in extent) that are referred to as digital orthophoto quads (DOQ).3 The U.S. Department of Agriculture Forest Service (FS) also produces this standard dataset.

Status:

Completion of once-over DOQ coverage for the State of Utah is nearly complete (Section 6, Map 1). This represents a first generation product initiated in 1994 using 1993 National High Altitude Aerial Photography (NAPP). Completion is projected for 2001 using 1997 NAPP. Utah and its federal and local government partners expect to extend this program to develop second-

1 Page 18, "Framework Introduction and Guide," Federal Geographic Data Committee, Washington D.C., 1997.

2 USGS "National Mapping Program Technical Instructions Standards for Digital Orthophotos," December 1996 and "Framework Introduction and Guide," Federal Geographic Data Committee (FGDC), Washington D.C., 1997.

3 Another term is quarter quad or DOQQ.

generation DOQs where needed with priorities determined by high urban growth or other issue based areas.

Standards:

Standards for DOQs are described in the USGS "National Mapping Program Technical Instructions Standards for Digital Orthophotos," dated December 1996.

Priority:

Priorities for second-generation coverage would be the urban corridor along the Wasatch Front from the central part of the state (city of Nephi) north through the Provo-Orem city area, Salt Lake Valley, Ogden, to Cache Valley. The metropolitan areas of Tooele, Park City, and Heber in northern Utah and the urban corridor of St. George to Cedar City in southwestern Utah would also be included. All these regions represent unprecedented metropolitan growth during the past decade and this data set would contribute to the urban planning and growth, transportation planning, and watershed management in these areas.

Replacement of DOQs produced with older NAPP aerial photography is also a second-generation coverage priority. Additional second-generation coverage would be identified based on issues pertinent to federal, state, and local requirements for the data.

Total Current Investment in Theme:

Approximately over $5,000,000.00 has been spent to date for DOQ coverage for the state.4 This total also represents DOQs currently in production except for those noted in the 'Estimate of Current Allocation of Funding / Resources for This Theme' paragraph of this section.

Contributions by Sector:

Contributions have been from both the state and federal sectors. In addition the Interior Geographic Data Committee (IGDC) Base Mapping Working Group has allocated funding through the Department of Interior (DOI) High Priority Program for DOQs in the state.

Estimate of Investments Needed to Complete This Theme:

Estimated cost for second-generation coverage for the priority areas described above is $803,200.00. This estimate is based on the current cost of $800.00 to produce one 1:12,000-scale, 3.75-minute DOQ for the 1,004 quarter quads in the priority areas.5 This number of

4 Based on previous production cost of $900 (1994 – 2000) and $800 (2001) per DOQ (1:12,000-scale, 3.75-minute).
5 Cost estimate from "USGS FY 2001 Fixed Price Schedule For Standard Maps and Data." Estimated production costs only and does not include delivery costs. DOQs are produced through cost share partnerships with the USGS.

quarter quads is based on the amount of total second-generation quads; for either urban growth areas or replacement of DOQs produced with older NAPP aerial photography required in the counties in which the priority areas fall.

The intent is to create new DOQs on a ten year cycle. There are approximately 1540 quads covering the State. The total cost for quarter quad creation will be $4,928,000 over each ten year interval.

Estimate of Current Allocation of Funding / Resources for This Theme:

The FS is currently funding and producing DOQs for the following projects: Dixie National Forest, 280 (264 are second-generation); Sawtooth National Forest (Utah), 36; and the Humboldt Desert Range Experiment Station, 32. The IGDC Base Mapping Working Group through the DOI High Priority Program has allocated funding for 369 DOQs this fiscal year. To complete the remaining 184 DOQs for once-over coverage in the state, the USGS, BLM, and the State of Utah recently signed an agreement for $148,630.00.6

Describe Ways to Fund This Gap:

Funding for the second-generation orthoimagery would come from cost share partnerships between the state and federal governmental agencies with interests in the area for the production of orthoimagery. Coordination for these efforts would be through the state's Geographic Information System Advisory Council (GISAC), which has the leadership and authority for this effort.

Most Appropriate Data Steward:

The primary archive and distribution point for orthoimagery data produced by the USGS is located at the EROS Data Center (EDC) in Sioux Falls, South Dakota. The general public can order orthoimagery data from this database.

The State Geographic Information Database (SGID) is an established digital database in the State of Utah.

Maintenance Process and Cost:

Not known at this time.

6 Amounts are 1:12,000-scale, 3.75-minute DOQs.

Elevation

Theme Description:

The FGDC "Framework Introduction and Guide" explains "elevation as data to provide information about terrain. Elevation refers to a spatially referenced vertical position above or below a datum surface. The framework includes the elevations of land surfaces and the depths below water surfaces (bathymetry)." Elevation data can be used as a representation of the terrain, such as a contour map, post elevations or a three-dimensional perspective. The data can also be used to build models to perform applications ranging from line-of-sight calculations, to transportation planning, and watershed management. Elevation data is often combined with other digital data themes for modeling and mapping applications.7

There are many ways to represent elevation data sets and/or models. The standard product that the U.S. Geological Survey (USGS) produces and uses is represented as a digital elevation model (DEM) collected in 10- or 30-meter grid spacing with coverage in 7.5- x 7.5-minute blocks. Each coverage provides the same coverage as a standard USGS 7.5-minute quadrangle without overedge. Additionally seamless and multiresolution digital elevation data sets are now becoming available through the USGS.

Data Sources:

Primary sources for DEMs are the USGS and the U.S. Department of Agriculture Forest Service (FS).

LIght Detection And Ranging (LIDAR) and Interferometric Synthetic Aperture Radar (IFSAR) are currently being researched and utilized as new technologies to produce digital elevation data sets.

Status:

As of March 15, 2001 state coverage for 30-meter DEMs is 100% and 57% for 10-meter DEMs (Section 7, Maps 1).8

Standards:

Standards for DEMs are described in the USGS 'National Mapping Program Technical Instructions Standards for Digital Elevation Models,' dated January 1998.

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7 Page 19, "Framework Introduction and Guide," Federal Geographic Data Committee, Washington D.C., 1997.

8 This 57% completion percentage includes 10-meter DEMs currently in production.

Priority:

Priority for 10-meter DEMs is completion of once-over state coverage. Specific priority areas would be the urban corridor along the Wasatch Front from the central part of the state (city of Nephi) north through the Provo-Orem city area, Salt Lake Valley, Ogden, to Cache Valley and also areas including the cities of Tooele, Park City, and Heber. All these regions represent unprecedented metropolitan growth during the past decade and this data set would contribute to the urban planning and growth, transportation planning, and watershed management in these areas.

Total Current Investment in Theme:

Approximately $1,307,000.00 has been spent to date for both 30- and 10-meter DEM coverage. Estimate based on $772,000.00 for 100% completion for 30-meter DEM and $535,000.00 for 57% completion of 10-meter coverage for the state.9

Contributions by Sector:

Contributions have been from both the state and federal sectors.

Estimate of Investments Needed to Complete This Theme:

Estimated cost to complete once-over state coverage for 10-meter DEMs is $460,230.00. Estimate based on the current cost of $690 to produce one 10-meter DEM for the remaining 667 7.5-minute quadrangles in the state.10

Estimate of Current Allocation of Funding / Resources for This Theme:

As of March 15, 2001 there are 76 10-meter DEMs in production.

Describe Ways to Fund This Gap:

Funding for the priority areas in the state would come from governmental, business, private organizations, and single entities organizing a consortium to cost share for the production of 10-meter DEMs after identifying and reaching a consensus for elevation coverage in a specific area. Coordination for this effort would be through the state's Geographic Information System Advisory Council (GISAC), which has the leadership and authority for this effort. GISAC membership is composed of representatives from a broad spectrum of governmental and business organizations.

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9 Based on previous production costs for DEMs.

10 Cost estimate from 'USGS FY 2001 Fixed Price Schedule For Standard Maps and Data.' Estimated production costs only and does not include delivery costs. DEMs are produced through cost share partnerships with the USGS.

Most Appropriate Data Steward:

The primary archive and distribution point for elevation data produced by the USGS is located at the EROS Data Center (EDC) in Sioux Falls, South Dakota. The general public can order elevation data from this database.

The State Geographic Information Database (SGID) is an established digital database in the state of Utah that also archives elevation data.

Maintenance Process and Cost:

Not known at this time.

Transportation

Theme Description:

The transportation layers often include many features of transportation networks and facilities. For the purpose of this initial plan, only roads are included. For transportation issues related to growth, economic development, disaster preparedness, emergency response (especially wildfires) and public land management, all roads must be included in the transportation framework.

There are multiple versions of roads data maintained in Utah. One is a comprehensive GIS version that is a collaboration of state, federal, and local government agencies which complies to the Utah Transportation Data Model (Appendix 4). Another is a derivative of that, maintained by the Utah Department of Transportations that is used for network analysis of state and federal routes, and which carries some additional attributes. AGRC currently maintains a version of 1:24,000 scale roads derived from USGS Digital Line Graph (DLG) and Forest Service Cartographic Feature File (CFF) data, which will be replaced by the collaborative version described above. There is also the transportation data available from U. S. Census Bureau Tiger Files, which currently supplies the best version of address data for the state.

Data Sources:

There are many sources for this data. The State of Utah, U. S. Geological Survey, Forest Service, and the Bureau of Land Management have cooperated over the last several years to complete the initial digitizing of roads from the 1:24,000 map sheets. This data, which has a nominal positional accuracy of 20 meters, meets the traditional needs of many state and federal agencies. Because many of these maps were 20 – 50 years old, a revision process has started to bring them up to date. Revising those old maps from DOQs and other photographic sources, has been necessary to make them more accurate, complete, and current.

State policy for GIS implementation has recognized that users close to the geographic features usually have first hand knowledge of the data and can provide more accurate and timely data. Many rural counties have not had the resources to fully participate and provide accurate credible data to this effort without assistance however. To that end, the State Legislature has provided funding for the counties to purchase GIS and GPS equipment and begin a process to inventory and map every road in the county. For a variety of county responsibilities, sub meter GPS generated roads centerline data is required. This data, which incorporates the Utah Transportation Data Model, will contribute to the State Geographic Information Database (SGID) and the NSDI. Even though state and federal agencies traditionally relied on the 1:24,000 data described above, this sub-meter fully attributed data will provide much more useful information for them. From the start, this process has adhered to the Framework principles initially defined by the FGDC. The most important concept being the use of the best available

data for the NSDI.
The State is also working with the Utah Association of Counties and the Census Bureau to identify and integrate address information tied to transportation systems. The Utah Association of Counties has been instrumental in engaging the counties in a discussion about rural addressing standards relative to transportation. The Census Bureau has talked to state and local agencies about options for improvement and modernization of information about transportation features in TIGER.

Status:

Three maps are included to illustrate the status of the transportation mapping efforts described above. The first status map included in this section (Section 8, Map 1) indicates the vintage of the digital data currently. It is easy to tell from that status map which ones have been revised in the last few years and which ones are 10, 20 or 30 or more years old. Another status map (Section 8, Map 2) indicates the completion percentage of the roads each county has GPSed.
The third map (Section 8, Map 3) identifies agency responsibility or current mapping activities by funding participants.

Standards:

Separate standards are being used for the different versions of this data theme. For the 1:24,000 digitizing and revision effort, the collaborators are compliant with the Federal Single Edition Program. This program is a national effort where the Forest Service has accepted responsibility for completion of Quads containing any Forest Service lands and the USGS has accepted responsibility for the rest. AGRC has processed these data into a consistent layer for the state. This version has many limitations for state and local uses because the attributes reflect cartographic symbols only and does not lend itself to analysis from jurisdiction, functional class, surface types, width, use restrictions, etc. The USGS has developed a standard for their Digital Line Graph (DLG) product that is the primary guidance for this layer although the Forest Service Cartographic Feature File (CFF) standard is used by AGRC for accuracy in the conversion process.

For the county based work and to develop a comprehensive framework transportation data layer, the Utah Transportation Data Model has been developed. It is the result of a multi-jurisdiction effort to compare the basic transportation data needs of most federal, state, and local agencies transportation data needs in Utah. The full data model is included in Appendix 4. This standard has now been implemented by most counties and is the model for transportation data in the SGID. As it gets more widespread use and tested in different environments, it is anticipated that minor modifications will be made.

The State, the counties, and Census must continue to work with the Postal Service and other interested parties to incorporate existing address standards and develop those still needed especially those relating to rural addressing systems.

Priority:

The transportation data layer has been one of the highest priority data layers in the state for several years and will be for several more until the first comprehensive framework version is complete. Development of many other data layers and most applications in the state are dependent on the completion of this layer.

Total Current Investment in Theme:

Starting in 1995, this collaborative effort has consumed many of the State's resources dedicated to GIS. Since the first Innovative Partnership Agreement signed between the State of Utah and the USGS in 1995, the State has spent approximately $1,500,000. During that period, the Forest Service and USGS may have spent even more than that. The State and USGS have collaboratively outsourced the revision of 337 quads, while the Forest Service has completed 218 quads to date. Additionally, in recent months, those two federal agencies revised 70 1:24,000 quads for the 2002 Olympics at a considerable cost although they made the decision not to update the DLG data. 917 1:24,000 quads remain to be revised using current photography and other local sources.

For the GPS effort by the counties, the State of Utah has appropriated $950,000 for financial assistance directly to the counties. The U. S. Congress has appropriated another $900,000 for that effort. Typically the rural counties spend 3 dollars for every one they receive through these grants. The urban counties have done much of this entirely on their own. The State of Utah has also spent nearly $500,000 for training, technical assistance, quality control, and database administration for this project so far. The total to date for this GPS/GIS effort is well over five million dollars.

Contributions by Sector:

See above.

Estimate of Investments Needed to Complete This Theme:

The State and federal agencies are reliant on the high quality GPS data coming in from the counties to contribute to the ongoing revision effort. The revision activity described earlier will become more of a QA/QC process to check for accurateness and completeness of the coordinate information and all attribute information. To that end, we want to expedite the completion of the GPSing of road centerlines and fieldwork necessary for attribute definition. Currently, nearly 50% percent of the roads have been GPSed, nearly 25% have been attributed, and about 10% have been QA/QCed. To complete this process another $5,000,000 ($100/per mile X 50,000 miles remaining) is needed.

From that complete comprehensive framework database, the DLGs can be updated at a total cost

of $320,950 (917 quads X $350 per quad). Also, UDOT will be able to finalize the State transportation network for state and federal routes for another $50,000.

Both the executive and legislative branches of Utah State government have demonstrated their commitment to this effort by prioritizing funding efforts. All twenty nine counties in Utah are committed to GPSing their roads and contributing the data to the SGID. Most federal agencies are committed to participating to the extent that their budgets allow.

Estimate of Current Allocation of Funding / Resources for This Theme:

We anticipate future allocations by State, federal, and local agencies to continue at about $2,000,000 per year. Because of the extreme value and urgent nature of this data layer, additional dollars available through federal agencies is necessary.

Describe Ways to Fund This Gap:

The most important and practical way to fund this gap would be to have a federal agency take responsibility for the creation of a national transportation framework data layer! The USGS, Forest Service, and the BLM have been able to contribute some money, but not much and usually with constraints that make if less efficient that could be. So far, the State of Utah and the counties have contributed the largest percentage of funds to this data layer, but the federal government is one of the primary beneficiaries. Because of that, the federal government should allocate more to agencies that can be distributed to local government.

Most Appropriate Data Steward:

After many years of meetings in Utah about transportation data, we feel we have arrived on an optimum model for data creation, maintenance, and distribution. Our intention is to have local government create data as they are most familiar with what is on the ground. AGRC will integrate this locally generated data and do the quality control necessary to insure accuracy and completeness. State and federal agencies will then have access to it to use in their products. An example of this is the Forest Service is currently using data from the counties in conjunction with their revision of the maps on the Fish Lake National Forest with AGRC doing the QA/QC. All current data will be catalogued, documented, and distributed through the SGID as outlined in the Data Sharing MOU (Appendix 1).

Census must continue to update and maintain address ranges for their products but the primary custodian of this data should be local government. Since there is currently no federal agency that has overall responsibility for all roads features, it makes sense that the Census Bureau be given that responsibility through the revised OMB Circular A-16.

Maintenance Process and Cost:

Maintenance, including periodic revisions, will continue through the stewards and process defined above. Costs will be minimal and just part of agencies ongoing operational activities.

Section 9.

Hydrography

Section 9A.

National Hydrography Dataset

Theme Description:

The National Hydrography Dataset (NHD) is a comprehensive set of digital spatial data that contains information about surface water features such as lakes, ponds, streams, rivers, springs, and wells. Within the NHD, surface water features are combined to form "reaches" which provides the framework for linking water-related data to the NHD surface water drainage network. These linkages enable the analysis and display of these water-related data in upstream and downstream order.

High Resolution NHD (1:24,000-scale) is a combination of the Environmental Protection Agency's (EPA) Reach File Version 3.0 (RF3) and U.S. Geological Survey (USGS) Digital Line Graph (DLG) hydrography files: hydrologic ordering, hydrologic navigation for modeling applications, and a unique identifier (reach code) for surface water features from RF3; and the spatial accuracy and comprehensiveness of DLG hydrography.

The NHD is designed to provide comprehensive coverage of hydrologic data for the United States. It is based on 1:100,000-scale data (called low resolution) and designed to incorporate – and encourage the development of higher resolution data that may be required by users. It will also facilitate the improved integration of hydrologically related data in support of the application requirements of a growing national user community and will enable shared maintenance and enhancement.

Data Sources:

Primary sources for the reach files are the EPA and the USGS for the DLG hydrography. The 1:100,000-scale data will also be provided by the USGS. Cartographic Feature Files (CFFs), 1:24,000-scale vector data produced by the U. S. Department of Agriculture Forest Service (FS) will be utilized for coverage of national forest system lands in Utah.

Status:

The USGS and the State of Utah Automated Geographic Reference Center (AGRC) have signed an Innovative Partnership (IP) agreement for a NHD project in Utah. Within the framework of this agreement the two agencies formed a partnership with the FS and the Bureau of Land Management (BLM) to coordinate the revision and updating of existing USGS 1:24,000-scale quadrangle DLG and FS CFFs to the USGS DLG hydrography dataset. A private Utah firm, REDCON is participating as the primary contractor.

Additionally high-resolution NHD watershed catalog units will be created utilizing 1:100,000-scale data and the revised hydrography data. To date one high-resolution sub-basin (4th level) in Utah has been created and one is currently going through the conflation process.11 Another is scheduled this spring to finalize the first phase of the project. For the project's second phase, 260 1:24,000-scale DLG hydrography layers will be revised and eight high-resolution NHD sub-basins will be created this year in eastern Utah.

All the revised and updated DLG hydrography data and the high-resolution NHD sub-basins will be incorporated into the NHD.

Standards:

There are two standards for NHD; USGS National Mapping Program Technical Instructions "Standards for National Hydrography Dataset – High Resolution," dated November 1997 and USGS National Mapping Program Technical Instructions "Standards for National Hydrography Dataset," dated July 1999.

Priority:

Priorities are twofold: completion of the remaining USGS 1:24,000-scale quadrangle DLG and FS CFFs to the USGS DLG hydrography dataset and secondly the high-resolution NHD of the remaining sub-basins watershed catalog units for once-over state coverage of these two data sets. To complete will take approximately five years.

Total Current Investment in Theme:

To date the current investment in the theme has been:

1994-1997	1,042 quads scanned, digitized, and converted to vector data layers for base-maps in SGID =	$593,750.00
1998-1999	335 quads revised @ $671/quad12 =	$224,869.00
	79 quads create high-res NHD (2 sub-basins) @ $450/quad =	35,550.00
	414 quads QA/QC revision and high-res NHD @ $344/quad13 =	139,071.00
		$399,490.00

11 Hydrologic unit hierarchy is as follows: Region (1st level), Sub-region (2nd level), Basin (3rd level), Sub-basin (4th level), Watershed (5th level), and Sub-watershed (6th level).

12 Rounded cost. Actual is $671.25/quad.

13 Rounded cost. Actual is $335.92/quad.

2000-2001	179 quads revised @ $698/quad =	$124,942.00
	260 create high-res NHD (8 sub-basins) @ $468/quad =	121,680.00
	439 quads QA/QC revision and high-res NHD @ $312/quad 14 =	137,100.00
		$383,722.00

Summary of total costs to date = $1,376,962.00

Contributions by Sector:

From 1994 to 2001 the USGS and Utah AGRC, through two Innovative Partnerships, have contributed the following amounts:

USGS - $537,500.00
AGRC - $839,462.00

Estimate of Investments Needed to Complete This Theme:

To complete the 1:24,000-scale revision process for the State of Utah will cost $2,549,768.00 based upon the following estimates (for the remaining quads within the state):15

1,028 quads revised @ $785/quad = $806,980.00
1,203 quads high-res NHD (58 sub-basins) @ $527/quad = 633,981.00
2,231 QA/QC revision and high-res NHD @ $497/quad = 1,108,807.00

Total Cost = $2,549,768.00

Costs per quad are an average of a 4% increase per year, figured for the five year projected completion time period.

Of the 68 sub-basins that encompass Utah 38 fall over the state's border. DLG data in these sub-basins will have to be revised and the sub-basin high resolution NHD created. Below is a list of the six states surrounding Utah and the number of quads and sub-basins in each respective state. It will be necessary to enter into cost share partnerships with these states to revise and complete the sub-basin high-resolution NHD in the states.

Arizona 216 quads - 7 Sub-basins

14 Rounded cost. Actual is $312.30/quad.

15 There are 1,542 total 1:24,000-scale quadrangles in Utah.

Photorevision @ $785/quad =$169,560.00
High-res NHD @ $527/quad = 113,832.00
QA/QC @ $497/quad = 107,352.00
TOTAL: $390,774.00

Colorado 194 quads - 10 Sub-basins

Photorevision @ $785/quad =$152,290.00
High-res NHD @ $527/quad = 102,238.00
QA/QC @ $497/quad = 96,418.00
TOTAL: $350,946.00

Idaho 118 quads - 7 Sub-basins

Photorevision @ $785/quad = $92,630.00
High-res NHD @ $527/quad = 62,186.00
QA/QC @ $497/quad = 58,646.00
TOTAL: $213,462.00

Nevada 151 quads - 8 Sub-basins

Photorevision @ $785/quad =$118,535.00
High-res NHD @ $527/quad = 79,577.00
QA/QC @ $497/quad = 75,047.00
TOTAL: $273,159.00

New Mexico 2 quads - 1 Sub-basin

Photorevision @ $785/quad =$1,570.00
High-res NHD @ $527/quad = 1,054.00
QA/QC @ $497/quad = 994.00
TOTAL: $3,618.00

Wyoming 117 quads – 5 Sub-basins

Photorevision @ $785/quad = $91,845.00
High-res NHD @ $527/quad = 61,659.00
QA/QC @ $497/quad = 58,149.00
TOTAL: $211,653.00

Total of costs to revise, high-resolution NHD, and QA/QC quadrangles in the adjacent states

required for sub-basins into Utah: **$1,052,838.00.**

Estimate of Current Allocation of Funding / Resources for This Theme:

It is estimated that to complete NHD in the state over the next five years (with a 4% increase in funding) will cost the following agencies currently involved in the on-going IP:

USGS – $170,000/year or $850,000.00 total.
AGRC - $339,954/year or $1,699,768.00 total.

To complete NHD for the out-of-state quads (also with average 4% increase in funding) if the same funding model used in Utah is applied in the surrounding states.

Arizona
$498,096.00

Colorado
$447,364.00

Idaho
$272,108.00

Nevada
$273,159.00

New Mexico
$4,612.00

Wyoming
$269,802.00

Describe Ways to Fund This Gap:

Funding for once-over state coverage would come from cost share partnerships between the state and governmental agencies with interests in the area for the revision and production of the DLG hydrography. Coordination for these efforts would be through the state's Geographic Information System Advisory Council (GISAC), which has the leadership and authority for this effort.

Most Appropriate Data Steward:

The State Geographic Information Database (SGID) is an established digital database in the State of Utah.

Maintenance Process and Cost:

Not known at this time.

Hydrologic Sub-basin Boundaries

Theme Description:

The Sub-basin is the fourth level (8-digit) of the hydrologic unit hierarchy.16 Sub-basins, which are sub-divisions of Basins, were formerly named 'cataloging units.' The average size for a typical sub-basin is 450,000 acres. They are subdivided into watersheds (usually 5-15 per sub-basin), which are further subdivided into sub-watersheds (usually 5-15 per watershed). Sub-basin and the interior watershed and sub-watershed boundaries are based primarily on natural surface water flow and topographic landforms.17 Sixty-eight (68) sub-basins encompass Utah and the surrounding states.

The digital data sets containing consistent and accurate attributes (including metadata information) derived from the delineation of the boundaries for the sub-basins, watersheds, and sub-watersheds will be added to both the national and state Geographic Information Systems (GIS) databases. This information will be used to better manage all the federal, state, and private lands in Utah. Additionally these databases will provide a basis for regional assessments of Utah's water resources for the foreseeable future.

Data Sources:

The U.S. Department of Agriculture Forest Service (FS) and the Bureau of Land Management (BLM) – the two primary land management agencies of federal lands in the U.S. – are currently allocating funding for the digitizing and delineation of sub-basin boundaries on federal and state lands in Utah.

Status:

Present watershed delineation has been done to the 4th level sub-basin unit at the 1:250,000-meter scale. However this is often too large an area to use for resolution in ecological studies on the potential impacts to plant and animal life that for example are dependent on a single spring, wetland, or stand of oak for their existence. The need for a finer resolution at the 4th level is therefore required – hence the need for delineation of the interior boundaries; watershed (5th level) and sub-watershed (6th level).

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16 Hydrologic unit hierarchy is as follows: Region (1st level), Sub-region (2nd level), Basin (3rd level), Sub-basin (4th level), Watershed (5th level), and Sub-watershed (6th level). The 68 sub-basins in Utah are in four regions, 12 sub-regions, and 15 basins.

17 Draft "Federal Standards For Delineation Of Hydrologic Unit Boundaries," dated December 18, 2000.

Standards:

Draft "Federal Standards For Delineation Of Hydrologic Unit Boundaries," dated December 18, 2000.

Priority:

To delineate and attribute sub-basin, watershed, and sub-watershed boundaries for all the sub-basins that encompasses Utah and the surrounding states. This delineation will be done in a consistent, reproducible method that meets national standards and is accepted by all governmental agencies, public land users, and any other potential data users in Utah or the surrounding states.

Total Current Investment in Theme:

Approximately $102,000.00 has been spent to date for 30 sub-basin boundary delineations.

Contributions by Sector:

The following agencies have contributed to the initial boundary delineation in the state: BLM, FS, and the USGS Water Resources Discipline (WRD).

Estimate of Investments Needed to Complete This Theme:

An estimated $129,200.00 is required to complete delineation for the remaining 38 sub-basin boundaries encompassing Utah and the surrounding states.18 Based on the current estimated cost of $3,400.00 for each sub-basin boundary delineation. This estimated cost also includes the delineation for the interior watershed and sub-watershed boundaries.

Estimate of Current Allocation of Funding / Resources for This Theme

Besides the USGS WRD the following two federal agencies have allocated funding for the following initial boundary delineations:

BLM – 20 sub-basins

FS – 10 sub-basins

Describe Ways to Fund This Gap:

Funding for once-over state coverage would come from cost share partnerships between the state and governmental agencies with interests in the area for the boundary delineation. Coordination for these efforts would be through the state's Geographic Information System Advisory Council (GISAC), which has the leadership and authority for this effort.

18 Of the 68 sub-basins that encompass Utah 38 fall over the state's border.

Most Appropriate Data Steward:

The State Geographic Information Database (SGID) is an established digital database in the state of Utah.

Maintenance Process and Cost:

Not known at this time.

Boundaries

Theme Description:

Boundaries are maintained in a series of layers representing the geographic extent of areas that define jurisdiction, taxation units or administrative management responsibilities.

Data Sources:

There are multiple sources for boundary related data in Utah. The primary sources are listed here with more details of current data availability in the status section.

- Census Bureau
- Bureau of Land Management
- US Forest Service
- Counties
- State Tax Commission

Status:

A sub-committee on boundaries was formed to identify the needs and directions for this theme. A disparate group of local and federal agencies collect and store various boundary information in Utah. Many of these data are currently incompatible in both a technical and a logistical sense. Issues such as who collects the data and how often, and who should store the data still must be resolved. In an effort to identify relevant boundaries, the accompanying table matrix identifies all known boundary types critical to any organization that functions or has interests in the state of Utah. **See the accompanying table.**

Total Current Investment in Theme:

Undetermined at this time.

Contributions by Sector:

See table.

Estimate of Investments Needed to Complete This Theme:

Undetermined at this time.

Estimate of Current Allocation of Funding / Resources for This Theme:

While we do not have a specific dollar amount, many agencies listed on the accompanying table currently have adequate or nearly adequate funding.

Describe Ways to Fund This Gap:

This issue has not been resolved.

Most Appropriate Data Steward:

See accompanying table.

Maintenance Process and Cost:

In general, each responsible agency would continue to collect and process the appropriate boundary data on the schedule that best fits each boundary type. Once issues such as meta-data and NSDI compliance on accuracy and content are established, we will be able to define a model for data exchange as well as a maintenance process.

Boundary Type	Datasource Name	Status E/P/NP	Data Steward	Meets NSDI	Update Cycle	Meta Data	Currently Funded	Total Annual Cost Across State	Contributing Agencies	Completion Estimate
		Exists, Planned, Not P		(Y/N/ P)	Date or schedule	(Y/N)	(Y/N)	Current Estimates in $$		Cost to Complete in $$
Legal or Political										
State		E	??	N	bi-annual		Y			
County		E	?	N	bi-annual		Y			
County Council Districts			?	N						
Special Service Districts			?	N						
Incorporated Places	TIGER	E	Census	N	bi-annual		Y			
Redevelopment Areas (RDAs)			?							
School Districts		E	?	N						
Attendance Zones			?							
Congressional Districts	TIGER	E	Census	N	decennial		Y			
Legislative Districts			?	N						
Voting Districts	TIGER	E	Census	N	decennial		Y			
City and County Planning Areas			?							
State Parks			?							
Native American Reservation Lands										
Reservations										
Off Reservation Trust Lands		E	BIA							
Tribal Subdivisions		E	BIA							
Department of the Army										
Corps of Engineers										
Civil Works Boundaries		E	COE							
Regulatory & Permit Boundaries		E	COE							
Forest Service										
Regional		E	FS							
Forest Boundaries		E	FS							
Districts		E	FS							
Primitive Areas		E	FS							
Wilderness Areas		E	FS							
Roadless Areas		E	FS							
National Park Service										
Environmental Protection Agency										
Ecoregions		E	EPA							
Fish and Wildlife Service										
Associations of Governments										
Bureau of Land Management										
Management Plan Areas		E	BLM							
Wildlife/Wetlands/T&E		E	BLM							
Bureau of Reclamation										
Department of Energy										
HUD										
Department of Agriculture										
Federal Aviation Adminstration										
Department of Justice										
Utah Emergency Management										
Federal Emergency Management Agency										
Federal Communiations Commission										
Census Bureau										
County Divisions	TIGER	E	Census	N	decennial		Y			
Tracts	TIGER	E	Census	N	decennial		Y			
Block Groups	TIGER	E	Census	N	decennial		Y			
Blocks	TIGER	E	Census	N	decennial		Y			
Traffic Analysis Zones	???	E	???	N	decennial		Y			
Census Designated Places	TIGER	E	Census	N	decennial		Y			
Public Use Micro-Data Areas	TIGER	E	Census	N	decennial		Y			
Urbanized Areas	TIGER	E	Census	N	decennial		Y			
Undefined Areas										
Strategic Reserves (Oil, Gas, etc..)										

Special Trade Zones										
ZIP Code Tabulation Areas										
5 digit	Census		Census							
3 digit	Census		Census							

Section 11.

Cadastral Data

The format of this theme varies somewhat from the other themes in this Plan. The Bureau of Land Management has an activity underway to develop plans for cadastral data by state and for the nation. The format for this section conforms to the BLM requirements which are not currently consistent with the I-Team requirements.

This section has been completed in two parts. Part A covers the Public Land Survey System and Part B covers administrative ownership as currently implemented in Utah. We anticipate the addition of Part C for subsurface ownership in the next revision.

Section 11-A.

Cadastral Data (Public Land Survey System)

Theme Description and Priority

The Public Land Survey System (PLSS) is a rectangular survey system that typically divides the land into 6-mile square townships, which are further subdivided into 1-mile square sections. The extension of the rectangular system of surveys over the public domain has been in progress since 1785. The PLSS is the primary survey and legal description system for defining the boundaries of the parcels of public lands, and forms the basis of patents issued when public lands pass out of Federal ownership. The legal descriptions for most of the western United States originate from the PLSS. Because the PLSS is the basis for all public and private land entitlement in the West, it is a critical component of the cadastral (land ownership) layer, one of 18 primary "framework" themes identified by the Federal Geographic Data Committee (FGDC) for implementation of the National Spatial Data Infrastructure (NSDI). The PLSS provides the spatial reference system for land ownership and title information.

Government organizations and private industry use the PLSS to portray parcel boundary and land record information in day-to-day business processes involving land transactions and entitlement; and as a foundation theme in Geographic Information Systems (GIS) to support analysis, planning, and decision making on complex land and resource issues. Many different representations of the PLSS exist that vary significantly in both content and accuracy, resulting in conflicting sources of information. The increasing use of Geographic Information Systems (GIS) in both the public and private sectors, and greater necessity for collaboration, identifies the need for a common, integrated cadastral infrastructure to facilitate decision-making at all levels.

Background and Purpose:

In the early 1990s, the Bureau of Land Management (BLM) began collecting the Geographic Coordinate Data Base (GCDB), The GCDB is a digital representation of the PLSS that provides

geographic positions to tie land ownership (cadastral) and other themes to the earth's surface. GCDB integrates survey records, horizontal control, and land descriptions to portray the legal land parcels described by the PLSS. GCDB is the preferred data source to portray parcel boundary and land record information in both public and private sectors. Unlike other PLSS representations, the GCDB depicts the PLSS to the public land parcel level, and can be readily updated with newer, more accurate information to increase its positional reliability. GCDB provides a more accurate PLSS land grid for parcel mapping at the local level.
The Western Governors Association (WGA) recognizes the GCDB as the "*best hope of standardizing the PLSS in the Western States*", and strongly endorses its use and continued enhancement. In June, 2000, WGA adopted *WGA Policy Resolution 00-005, Public Lands Survey System and Ownership Database*, and recommended that a unified plan for GCDB implementation across the West be developed in coordination with federal, state, tribal and local governments. The WGA planning effort is parallel with the Office of Management and Budget's (OMB) Information Initiative to align the needs and resources to continue development of NSDI framework implementation through mutually beneficial partnerships.

The State of Utah Cadastral Plan is a comprehensive, statewide plan developed through the collaborative efforts of federal, state, local and tribal governments to implement the recommendations of WGA Policy Resolution 00-005 The State of Utah, Automated Geographic Reference Center (AGRC), and the Bureau of Land Management (BLM), will lead coordination efforts to develop and implement the plan The purpose of the plan is to identify and communicate to management, and other stakeholders, the commitments and schedules to collect, integrate, maintain and distribute digital cadastral data that will provide accurate, cost effective parcel-based land information statewide. This plan will be incorporated into the OMB Utah Framework Implementation Plan for the cadastral framework layer.

General Status of Data and Sources

There are multiple sources for PLSS data in Utah, including U.S. Geological Survey and U.S. Forest Service (USFS) landnet derived from 1:24,000 scale cartographic products, AGRC Public Land Survey System (RSPLS), and survey records and control data from a range of public and private contributors. This plan primarily addresses the Bureau of Land Management's Geographic Coordinate Data Base (GCDB), and its collection, integration and enhancement with more current survey information from other public sources.

BLM, GCDB, Survey Records, PLSS GPS-coordinates, land ownership attribute information

The Utah State Office, collects and maintains the Geographic Coordinate Data Base (GCDB) from survey records, horizontal control, and land descriptions. BLM collects the GCDB data on a township basis. The survey boundaries are delineated by computing the geographic positions of township, section, aliquot part, government lot, and special survey corners from record survey plats. Next, official land descriptions are assigned to each land unit in the grid. The data is then standardized and converted to Arc Info coverages so Geographic Information System (GIS) software can be used to view the PLSS information spatially. The data can be readily updated

with new survey and control data.

Of the total 2,566 townships in Utah, GCDB is 90% collected in its native text format, and is currently being standardized and converted to a Geographic Information System (GIS) coverage format. Approximately ??% of the townships need topology and polygon label clean up to create a clean GIS coverage. Townships not collected include extremely complex townships, or townships along the Wasatch Front "urban corridor" where counties will have more current data. The GCDB currently contains only General Land Office (GLO) and BLM survey record data to 1991, with a growing backlog of survey and Global Positioning System (GPS) control data for update of the GCDB. The BLM has not incorporated survey or control data from external sources. The largest sources of external data reside with the Forest Service and local counties, and must be incorporated into the GCDB to improve its currency and accuracy.

USFS, Survey Records, PLSS GPS-coordinates, land ownership attribute information

The Utah Forests within USFS Region-4 include the Wasatch-Cache, Uinta, Ashley, Dixie, Manti LaSal, Fishlake and a small portion of the Sawtooth. The USFS maintains an active land line location program, dating to at least the early 1970s, which includes corner recovery and retracement, corner restoration, section subdivision and GPS data. There are numerous survey plats and control information that need to be incorporated into the GCDB. One issue with earlier USFS survey plats is that a local coordinate system was used and there is no geodetic tie. Additional fieldwork will be needed in some areas to collect this information before it can be integrated into the GCDB.

Counties, Survey Records, PLSS GPS-coordinates, land ownership attribute information

The Counties of Utah each maintain extensive survey records dating back many year, providing a comprehensive history of survey activities and ownership patterns. As the counties obtain more equipment, trained personnel, and funding, their ability to provide survey-grade GPS coordinates increases. These coordinates, as well as information on land ownership and transfer, form a basis for data that can contribute to the GCDB and Cadastral data layer as well as flesh-out ownership attributes.

Approach

Strategy:

The State of Utah Cadastral Plan describes the overall status and implementation strategy to collect, integrate, and distribute the most accurate, complete and current cadastral data available through the coordinated efforts of the various levels of government statewide. The plan will address technical issues, policy issues, and resource issues, including data content, data sources, funding and resources, as well as spatial accuracy development. The basic strategy is to: 1) inventory, catalog and evaluate existing data; 2) define standards and business rules for cadastral data functions that will facilitate data collection, integration and exchange; 3) create a central clearinghouse at the State level; and 4)

develop a systemized program for prioritized data collection and maintenance on a funded project basis, as well as on an ongoing basis as part of the daily businesses processes of various agencies' internal cadastral activities.

The plan will consist of detailed area plans for each of the 29 counties in Utah, with the option to combine counties to address larger geographic areas, if needed. Detailed plans will summarize the workload, resources, and time frames to collect, integrate, maintain, and distribute cadastral data in each county through the coordinated efforts of federal, state, local and tribal governments. Maps, tables and a township level data base will be developed to show inventory. status and progress. The State of Utah, Automated Geographic Reference Center (AGRC), will lead these collaborative-based planning projects.

Detailed pilot plans will be done first for selected priority areas, with updates and additional plans on an annual basis. Pilot plans will enable refinement of standards, procedures, workload estimates, task completion time frames, and cost estimates, and allow for phased planning and implementation, as funding allows.

Standards and Approach to Standards Implementation:

Standards provide the function of "normalizing" data and support the automation, exchange, and integration of publicly available data from multiple sources.

FGDC Cadastral Data Content Standard
http://www.fgdc.gov/standards/documents/standards/cadastral/
FGDC Cadastral Framework Standard (Pending)
State of Utah, Canyon Country Partnership, G5 GIS council Standard
http://www.landuse.com/coplateau/share/codes/ugic20rev3.htm
Canyon Country Partnership Cadastral Share Codes
http://agrc.its.state.ut.us/standards/cadcode.html
BLM, GCDB Coverage Format
http://www-a.blm.gov/standards/index.html

Establishing Priorities:

Priorities for the development of cadastral data content, in addition to and/or separate from cadastral data accuracy, may vary substantially from agency to agency. Local governments are at varying stages in There is an immediate need to integrate all existing "best available information" within a uniform system, while simultaneously developing increased spatial and content accuracy of the data over time. Meeting both of these needs is critical to maintaining the long term support and participation necessary to create an ongoing statewide cadastral system. Priorities will be identified based on the needs of federal, state, local, and tribal organizations with sensitivity to the different missions, goals, resources and schedules of these organizations The process for establishing priorities will take place in conjunction with the other players in this project. A number of factors will be considered in setting priorities for cadastral data development and

integration.

A. Mutually Important Areas

Participant priorities driving prioritization:

Federal priority areas
State priority areas
Local priority areas
Other priority areas

Issues driving prioritization:

Land use issues
Data need issues
Planning issues
Other issues…

Overlap of Participant Priorities and Driving Issues

B. Willingness of priority stakeholder(s) to contribute to process

Data availability
Conformance to standards
Required metadata documentation

Data Requirements and Stakeholders:

The entities with great concern for the development and maintenance of this data layer constitute the stakeholders in this process. Their concerns and interests will be enumerated as in along with their data requirements, to provide a comprehensive overview of how this plan's data development will interact with the expectations and needs of the stakeholders.

Detailed Project Plans:

A detailed area project plan will be developed for each of the 29 counties in Utah. Uintah, Duchesne and Emery counties have been identified as pilot project areas for initial plan development and implementation based on statewide priorities, and to represent a cross-section of Utah's counties. Refer to the appropriate appendix at the end of this section for specific county plans.

County	Appendix	Plan Status/Schedule/Priority
Beaver		TBD
Box Elder		TBD
Cache		TBD
Carbon		TBD
Daggett		TBD
Davis		TBD

Duchesne		Pilot in Progress/2001/ BLM RMP start
Emery		Pilot in Progress 2001/ BLM RMP start
Garfield		TBD
Grand		TBD
Iron		TBD
Juab		TBD
Kane		TBD
Millard		TBD
Morgan		TBD
Piute		TBD
Rich		TBD
Salt Lake		TBD
San Juan		TBD
San Pete		TBD
Sevier		TBD
Summit		TBD
Tooele		TBD
Uintah		Pilot in Progress/2001/BLM RMP start
Utah		TBD
Wasatch		TBD
Washington		TBD
Wayne		TBD
Weber		TBD

Detailed county plans will be organized under the general outline, Sections 5.1 though 6.4, as described below, with information specific to the county.

Inventory and evaluation of existing data sets

The product for this task I s a basic inventory of existing data for each county. Inventory consists of a presence/absence condition of the data in each township. Evaluation represents a more in-depth study of the data. Data may exist in several broad categories that need to be qualified by "condition". The idea of "preliminary" may imply data that is more than acceptable for one type

of use, while for another type of use, it could be wholly inadequate. In general, this "condition" can be defined by the needs of the data producer. Thus, if the producer of the data finds its current condition to be inadequate for their needs, then that data might be considered to be inadequate (even though another user of that data may find it acceptable). The product for this task is to identify areas of existing and missing PLSS/GCDB data and parcel data, and to document the content of information where it exists including PLSS corners (surveys and subdivisions), parcels (fee and non-fee), control, coincident boundaries, source, and method used to capture data. Data from various contributors will be inventoried and evaluated for specific data requirements (content and accuracy) identify areas where existing PLSS/GCDB data needs to be improved. Evaluate reliability, topological validity, content of data determine what is needed to improve data (e.g., corner recovery and GPS, regional adjustment, additional data collection etc.) identify areas where data from multiple sources should be integrated. Produces an electronic database for cadastral data by township that will reflect the status of each township and serve as a tracking mechanism.

Collection of PLSS/GCDB (Initial Collection)

The product for this task is a collected GCDB where it currently does not exist. Work includes computing initial township coordinates and subdivisions from survey and control records, and attributing township polygons with legal land description records to create the township "template".

Produces GCDB source data in text format (line work and polygon labels) that can be standardized and converted to a GIS coverage. The source data can be readily updated with new survey and control data.

Improvement of GCDB/PLSS (Build GIS Coverage)

The product from this task is a GCDB Arc Info coverage where GCDB is collected, but has been determined to need improvement. Work includes: standardizing and converting GCDB source data to an Arc Info coverage; improving GCDB source or coverage data to correct or improve topology, polygon labels, attribution; adding minor subdivisions or special surveys; adding metadata; migrating to standards; converting PCCS data to GMM or NILS.
Produces a standardized, seamless, GCDB ArcInfo coverage that is acceptable for use across government organizations for GIS and parcel mapping applications.

Integration and Reconciliation of GCDB/PLSS Data Sources (O&M)

The product from this task is a GCDB coverage that is integrated and updated with the most current and accurate survey and control data available from various identifiable sources. Work includes corner recovery, ground-truthing, collecting field measurements, analyzing and reconciling survey and control data from various sources to resolve data differences, and the incorporation and adjustment of new data into the GCDB solution to update GCDB source and coverage data.

Produces a GCDB Arc Info coverage that utilizes the most accurate, complete, and current data available from various levels of government that can be used as a common PLSS framework across government organizations.

Collection and Integration of Parcel Data

The product for this task will be adding and integrating parcel level data with GCDB. Parcel descriptions will be analyzed for parcel-ID/ownership attribution of GCDB legal land area/aliquot part separate from detailed digital parcel mapping. Produces a logically integrated parcel fabric that can be used to portray cadastral information consistently across organizational and political boundaries.

Maintenance:

Maintenance will require coordination between data producers, stewards and stakeholders and will require the development and administration of standards and protocols that ensure successful, efficient, data integration. Maintenance will require a set of standards and procedures to ensure consistency. Factors influencing maintenance include priorities, schedules, budgets, update cycles, availability.

Requirements

Strategy:

Create a control data base.

6.3 Identify procedures

Procedures will be jointly developed by the stakeholders to preserve national and local standards, as well as ensure that user needs are being met at each procedural step.

6.4 Identify roles and responsibilities

Coordination of data development and sharing activities should continue as a state-led activity.
"Framework" layers or critical data will require funded creation. Integration of differing data among themes should remain a centralized function. Data should be created and maintained by specific agencies that have a programmatic need or mandated responsibility
Local government roles and responsibilities for maintenance will vary by county depending on resources, in-house capability (surveyor)
Users most familiar with the geographic features can provide more accurate and current data, and will be encouraged to create and share data.

Data Producer, Data Provider, Data User, Data Integrator Data Steward

State of Utah, AGRC- central clearinghouse, data integrator (PLSS to other related themes)
BLM- GCDB Data Steward, Training to surveyors and technicians for data collection and processing for the integration of survey data into the GCDB

Funding for a Cadastral Data Infrastructure:

Estimate of the Total Investment in This Theme to Date:

Total investment in this theme will be estimated and provided in this sub-section. This figure will include staff, equipment, and collection time, as well as those activities that have contributed to maintenance up to this date. The cost figures will be broken down into logical categories.

Estimate Current Budget Contributions by Sector:(local, state, federal, tribal, private)
Current budget contributions will be illustrated by providing estimates in the following table format.

Funding for a Cadastral Data Infrastructure:

COUNTY	7.1 Total Investment in This Theme	7.2 Current Budget Contributions by Sector					7.3 Investments Needed to Complete This Theme	7.4 Costs for Cadastral Data Maintenance
		Local	State	Federal	Tribal	Private		
Uintah								
Duchesne								
Emery								

Strategy to Address Any Funding Gaps

The current funding strategy in Utah consists of several efforts, each of which will be spelled out in detail, and their applicability to filling funding gaps discussed.

Estimate of Investments Needed to Complete This Theme:

Not currently available.

Estimate Costs for Maintaining Cadastral Data:

Not currently available.

Describe Strategy to Address any Funding Gaps:

Not currently available.

Related Projects/Initiatives and Dependencies:

National Integrated Land System (NILS)
Office of Management and Budget (OMB), Information Initiative,
NSDI Framework Implementation

List of Contacts:

Federal Agencies:

US Department of the Interior
Bureau of Land Management
Utah State Office
324 South State Street
Salt Lake City, Utah 84154-0155

Daniel Webb
(801) 539-4135
dwebb@ut.blm.gov

Sandy Lewis
(801) 539-4158
slewis@ut.blm.gov

Don Gray
(435) 636-3646
dgray@ut.blm.gov

State Agencies:

State of Utah
Division of Information Technology Services
Automated Geographic Reference Center (AGRC)
5130 State Office Building
Salt Lake City, Utah 84114

Bob Nagel
(801) 538-3291
bnagel@gis.state.ut.us

Uintah County Details

This sections is an example of the County Detail sections that will be provided for each county in Utah. Uintah is used as a prototype at this stage since it's planning process is the most advanced so far. These sections will also include status maps for each category of data.

Uintah County:

Uintah County is roughly 4,600 square miles in size, and is located in the northeastern corner of Utah, in the central portion of the Uinta Basin. 168 townships are within, or intersected by, Uintah county's boundaries.

Land Ownership:

Federal	58 percent
Reservation	15 percent
State	8 percent
Private	19 percent

(*see figure 5a at end for current land status*)

Stakeholders:

NPS	Dinosaur National Monument
USFW	Ouray National Wildlife Refuge
BIA	
BLM	
USFS	Ashley National Forest
Tribal	Uintah-Ouray Indian Reservation, Ute Indian Tribe
State	

Uintah County – Randy Simmons, County Recorder

Inventory and evaluation of existing data sets

BLM-GCDB -- Not collected for 18 townships or 11 % of the county.

(*see figure 5b at end for current GCDB inventory*)

BLM -- Survey records and GPS positions for PLSS.
Uintah County -- Survey records and GPS positions for PLSS.
Ashley National Forest -- Survey records and GPS positions for PLSS.

Collection of GCDB (Collection)

Status: Collected = Computed and attributed, ready for coverage creation. **2364 Townships Collected**
Computed = Computed only, not attributed.
Not Collected = Not computed or attributed.
Category 5 & 6 = Highly complex, not collected or collected to PLSS only due to complexity

Existing Workload

	Township Number	Average Hours/Township	Workmonths (WM)
Not Collected	18	20	2.25
Computed	5	16	0.5
Category 5 & 6	13	522 (3 Months)	42.4 (3.5 years)
Total WM to GIS Validated			**45.15**

GCDB Collection Status by township:

Collected	145	*(9 collected to PLSS only, due to complexity*
Computed	5	
Not Collected	18	*(4 uncollected due to complexity – see Table 5a)*
Category 5 & 6	13	

(*see figure 5c at end for collection status*).

Improvement of GCDB (Arc/Info Coverage format generation)

Integration and Update of GCDB (O&M)

Collection and Integration of Parcel Data (county-level involvement required)

Maintenance

Maintenance will be discussed as it is earlier in Section 11-A of this document, but in much finer detail, and will be specific to the conditions and requirements present in each county.

Maintenance Requirements

Maintenance Strategy

Maintenance Procedures

Maintenance Roles and Responsibilities

Uncollected or Computed Townships

SLt01n17e	SLt02s18e	SLt03s20e	SLt08s18e
SLt01n18e	SLt02s19e	SLt03s25e	SLt11s24e
SLt01n25e	SLt02s20e	SLt04s19e	
SLt01s18e	SLt02s22e	SLt04s20e	
SLt01s19e	SLt02s25e	SLt06s21e	
SLt01s20e	SLt03s18e	SLt06s22e	
SLt01s25e	SLt03s19e	SLt07s21e	

Table 5a

Cadastral Data (Administrative Ownership)

Theme Description:

The strategic goal for this data layer is for the respective data steward agencies to jointly manage a single statewide integrated data set for surface land status and subsurface mineral status information. A series of intermediate goals and objectives to define processes and procedures to achieve the long term solution will be necessary. The Utah Cadastral Data Committee will be the forum used to define and implement the data development plan for this data set.

Surface ownership depicts general categories of surface land ownership. (eg. Federal land owners, State government entities, private). Polygon data for ownership is currently collected and maintained by a variety of organizations which are primarily government. The current administrative land and ownership dataset depicts the Bureau of Land Management 1:100,000 scale land ownership quadrangle maps published by the BLM along with some modifications described below in the status section.

Data Sources:

The Public Land Survey System landnet (townships, sections, lots, aliquot parts) provides a base for the ownership layer. Currently a variety of landnet versions are employed (GDCB, CFF, 24k DLG, 100k DLG, 500k DLG). Government land records from a variety of sources provide the information regarding the surface ownership (eg. Bureau of Land Management=s Case Recordation Files and Master Title Plats; State of Utah Land Records and Master Title Plats, County Recorder Plats, USFS land records).

There are multiple sources for the administrative land and ownership data in Utah.
Utah School and Institutional Trust Lands Administration (SITLA) - revises and updates the data regularly to reflect changes to State Trust Lands through exchanges, swaps, and acquisitions.
The other primary sources for the data are listed below.

- Bureau of Land Management
- US Forest Service
- Private
- National Park Service
- State Park and Recreation
- US Fish and Wildlife Service
- Native American Tribes

Status:

Currently many government offices collect and maintain this information. There is no one standard used by all agencies for this data layer. Therefore, there are numerous versions of the

data set at various scales. A statewide dataset currently exists at 1:100,000 scale, however some agencies maintain 1:24,000 scale data in regional offices for their respective areas. The content of these various datasets has not been rectified and these datasets currently do not agree in content.

Currently, responsibilities are as follows:

-Get exchanges, swaps, and especially new acquisitions to SITLA to update ownership
-AGRC will replace current theme available through the State Geographic Information Database (SGID) ftp://ftp.agrc.state.ut.us/state_wide/aolsa.e00 with quarterly updated theme from SITLA.
-Any major changes between quarterly updates should be notified to the AGRC.
-Intent to integrate with the GCDB for further accuracy.

Standards:

There have been some past efforts to develop a common standard for this data layer. The Canyon Country Partnership Data Group includes representatives from counties, state, federal entities. It has drafted up standard Ashare codes@ for this data layer. Aside from that, each entity which collects and maintains this data uses its own Astandard@.

Priority:

The goal of this theme is to develop a single statewide dataset at 1:24,000 scale. The Bureau of Land Management is beginning Resource Management Planning efforts in portions of the state and this is a critical data layer for those projects. The work can be accomplished in phases to coincide with the BLM planning projects and the priority areas are eastern and south central portions of the state. The initial task to be completed is the definition and agreement for common data standard and data structure. The next steps are to complete the GCDB data for the priority areas and then to integrate the various datasets or the information from the best and most accurate datasets.

Total Current Investment in Theme:

Not available at this time.

Contribution by Sector:

Not available at this time.

Estimate of Investments Needed to Complete this Item:

Complete GCDB landnet
Define a common data standard
Integrate various sources of existing ownership data
Define Review and Update Proces

Estimate of Current Allocation of Funding for this Theme:

Not available at this time.

Describe Ways to Fund this Gap:

Because this is a layer required by multiple federal, state, local, and Tribal entities there must be a way to distribute the costs associated with maintaining this theme. Each sector of government currently contributes data necessary for this theme. All state agencies benefit, but currently SITLA is expending resources that would best be covered by a ongoing legislative appropriation. SITLA estimates that it requires one full time employee (FTE) to maintain this theme.

Most Appropriate Data Steward:

SITLA and BLM

Maintenance Process and Cost:

The I-Team must still identify the location for the dataset to reside and establish a process for check-out/check-in and validation. Currently AGRC maintains the latest version of the Administrative Ownership layer in the SGID. SITLA informs AGRC when a new coverage is available. AGRC does additional processing that adds two new items that assigns new codes for general ownership categories to the coverage. The final items and categories still need to be determined.

Demographics

Theme Description:

Demography is the study of population, including size, composition, distribution, density, growth, and other characteristics. The Demographic and Economic Analysis (DEA) section of the Governor=s Office of Planning and Budget (GOPB) manages, analyzes, and disseminates demographic, economic, and fiscal data on the state of Utah. There are multiple sources for this data, including state and federal entities.

Data Sources:

The demographic data sets housed in GOPB include: state and county population estimates from the Utah Population Estimates Committee (UPEC); decennial census data on population and housing characteristics from the U.S. Census Bureau; state and county population and employment projections from the Utah Process Economic and Demographic Model (UPED), housed in GOPB; city projections produced by GOPB and Utah=s seven Associations of Government (AOGs); state and county total personal income and per capita income from the U.S. Bureau of Economic Analysis; state and county labor force, employment, and unemployment data from the Utah Department of Workforce Services; and state and county residential building permit data from the Bureau of Economic and Business Research at the University of Utah.

Status:

State and county population estimates are produced annually by UPEC and are currently available through the year 2000. U.S. Census Bureau data, down to the block level, are available from past censuses as well as from Census 2000. State and county population and employment projections from the UPED model system are available through 2030. City projections from GOPB and the seven AOGs are available through 2030. Total personal income and per capita income from the U.S. Bureau of Economic Analysis are available at the state and county levels for the years 1980-1998. The labor force and employment data from the Utah Department of Workforce Services are available for the years 1980-1999 at the state and county levels. Data on residential building permits are available for the years 1980-1999 at the state and county levels.

Standards:

FGDC Metadata Standards will be used to document demographic data where applicable.

Priority:

Maintaining the demographic and economic data sets is one of the highest priorities of the DEA section. State and county demographic and economic data profiles are updated periodically to

reflect new releases or revisions in a data set.

Total Current Investment in Theme:

Currently, there are three FTEs working full time on this theme at GOPB for an annual cost of approximately $125,000.

Contributions by Sector:

Although there are many other agencies involved in this theme, no dollar amount is available.

Estimate of Investments Needed to Complete This Theme:

Current funding of $125,000 annually is what is required.

Estimate of Current Allocation of Funding/ Resource for this Theme:

$125,000 annually.

Describe Ways to Fund This Gap:

Current appropriation is satisfactory.

Most Appropriate Data Steward:

The Governor's Office of Planning and Budget, State Data Center.

Maintenance Process and Cost:

Maintenance of the data sets will continue through the Governor=s Office of Planning and Budget as part of DEA=s work plan with current appropriation.

Wetlands

Theme Description:

The National Wetlands Inventory is data that carries information about the characteristics, extent and status of the Nation's wetlands and deepwater habitats. The Emergency Wetland Resources Act of 1986 directed the U.S. Fish and Wildlife Service to map the wetlands of the United States. The act also required the Service to produce a digital wetlands database for the United States. AGRC has digitized 228 quads for various projects, such as the Quality Growth Efficiency Tools (QGET) project. These quads are distributed through the SGID. These projects are part of the Governor's MOU.

The Fish and Wildlife Service is currently involved in projects that use the NWI database. One of these projects is the calculation of the acreage of isolated wetlands throughout the state. These isolated wetlands must have an assessment for development. These isolated wetlands are no longer protected due to a Supreme Court ruling. This project is essential to the protection of wetlands that are not connected to jurisdictional water rights. The completion of this project depends on the digitizing of the wetlands of Utah. At this time only about 14% of the state is digitized and only 17% is in final hardcopy maps.

Data Sources:

The primary sources of data will come from photo-interpretation of Digital Orthographic quadrangles (DOQs), both STATSGO (general), and SSURGO (detailed) soils data, and vegetation data and Corp of Engineers' floodplain data. Fish and Wildlife Services uses all of these data as a basis to identify and delineate categories of wetlands.

Status:

- 126 quads are in the process of photo-interpretation.
- 42 quads need to be digitized from hardcopy maps.
- 1146 quads have been photo-interpreted and need to be developed into draft and then final hardcopy maps, digitized and QC for insertion into the NWI database and the SGID.
- 228 quads need to be QC for certification and insertion into the NWI database.

Standards:

The standards cited from "Classifications of Wetlands, and Deepwater Habitats of the United State", 1979, Cowardin, et al.

Priority:

The digitizing and QC of the remaining available hardcopy maps is the first priority. As new hardcopy maps are available, digitizing and QC of these for distribution through the SGID and NWI database should be the next priority.

Total Current Investment in Theme:

228 quads photo-interpreted, draft and final hardcopy, and digitized
@$2,000 = $456,000
42 quads photo-interpreted, draft and final hardcopy
@$1,500 = $63,000
1146 quads photo-interpreted
@ $500 = $573,000
Total $1,092,000

Contributions by Sector:

Fish and Wildlife Service has compiled and is presently photo-interpreting 126 quads. It has photo-interpreted, delineated, classified 1416 quads. There are 270 quads in draft and final hardcopies, with 116 digitized quads in the NWI database. The AGRC has digitized 228 of the hardcopy quads for distribution through the SGID.

Estimate of Investments Needed to Complete This Theme
126 quads, photo-interpretation, draft and hardcopy, digitize, and QC
@ $2,500 a quad = $315,000
42 quads, digitize and QC final hardcopy maps
@ $1,000 a quad = $42,000
1146 quads, draft and final hardcopy, digitize and QC,
@ $2000 a quad = $2,292,000
228 quads, QC for distribution through the SGID and NWI database
@ $500 a quad = $114,000
Total $2,763,000

This project should include an overhead of 8% of total cost of the project. This overhead would be approximately $230,000, including costs of the Fish and Wildlife Service and the SGID administration.**

Estimate of Current Allocation of Funding / Resources for This Theme:

There is currently no funding through the Fish and Wildlife Service for photo-interpretation, draft and hardcopy mapping, and digitizing of the wetlands. There is currently $5,000 funding from the SGID administrative fund for the QC process of the 228 quads currently in the SGID.

Describe Ways to Fund This Gap:

There is a huge funding gap in the digitizing process of the wetlands. Part of this funding gap could be corrected through a cooperative agreement between the State of Utah and Fish and Wildlife Service and other agencies that use the NWI database, but additional funding would be necessary to complete the project.

Most Appropriate Data Steward:

The Fish and Wildlife Service is the creator of the data. The SGID is the present steward of the digitized data. Any digitized data should be distributed through the SGID and submitted to the NWI to be included in the National Database.

Maintenance Process and Cost:

Updates to the NWI and maintenance costs are yet to be determined.

Geology

The geology theme can be broken down into three basic subsections: (1) geologic maps of surface exposures, (2) geologic hazard maps, and (3) geologic resource maps. Other specialized geology maps, such as gravity anomaly, magnetic, subcrop, alteration, surficial deposits, etc. are not considered basic geology themes and are not considered here, although they may merit inclusion in the future.

Part A. GEOLOGIC MAPS OF SURFACE EXPOSURES

Theme Description:

Geologic maps of surface exposures are the "standard" geologic maps that form the basis for most specialized geologic maps and studies of large or small areas. The Utah Geological Survey (UGS) focuses on three standard scales of geologic maps: 1:500,000 (state map), 1:100,000 (30'x60' quadrangle bases), and 1:24,000 (7.5' quadrangle bases). Each scale has different uses, and eventually all three should be completed in GIS format.

Data Sources:

(1) The Geologic Map of Utah, by Lehi Hintze, published by the Utah Geological (and Mineral) Survey in 1980, is the 1:500,000 scale geologic map of the state.

(2) 1:100,000 maps are digitized from published maps where available; for much of the state, new field mapping is required to complete maps at this scale (see Map 14-1). The UGS currently has a team of geologists working in the field to complete this new mapping.

(3) Approximately 400 of the 1,512 quadrangles in the 7.5' (1:24,000 scale) are currently completed as paper maps, though some of these date back to the 1950s and are not suitable for all purposes. Five to ten new quadrangles are completed each year (see Map 14-2).

Status:

(1) In 1999 the UGS and U.S. Geological Survey jointly funded conversion of the Geologic Map of Utah (1:500,000 scale) to digital, GIS format. The digital database is complete and has been released. It can now be incorporated into the SGID.

(2) As of March 20001, seven of the forty-six 30'x60' quadrangle maps at 1:100,000 scale are completed or nearly completed in GIS format by the UGS, and are being prepared for release to the public as of November 2000. Seven quadrangle maps are published in paper format, but have not been completed in GIS format. The remaining maps require additional geologic map preparation, and have either not been started or are in progress (see Map 14-1). We estimate

that at current rates of completion, it will take about 15 years to complete the state at 1:100,000 in printed and GIS format.

(3) The UGS is currently working on about ten 7.5' quadrangles for completion in GIS format. Another thirty-two quadrangles are completed but there are no current plans to finish them in GIS format. Another 422 quadrangle maps are published in paper format, but have not been converted into GIS format. Mapping has not been started on the remaining 1,078 quadrangles. No other maps are available in GIS format at this scale. At the current rate, it will take more than a lifetime to complete field mapping of the incomplete quadrangles in the state. Thus, we concentrate on high priority areas, such as areas of rapid urban growth, high recreational use, geologic resources, or potential geologic hazards.

Standards:

The UGS follows standards set by the National Cooperative Geologic Map Program, which is headed by the U.S. Geological Survey and the Association of American State Geologists, and that works closely with a geologic subcommittee of the FGDC.

Priority:

Mapping priorities are set by the State Mapping Advisory Committee (SMAC), a group of seven representatives from the community of geologic map users. Representatives are appointed by organizations such as the Utah Geological Association, interested government agencies, and from the community at large. The SMAC meets once a year to set priorities. The current top priority is to complete the 1:100,000-scale map series.

Total Current Investment in Theme:

The Utah Geological Survey has spent about $500,000 to prepare GIS files of existing geologic maps.

Contributions by Sector:

The National Park Service, U.S. Forest Service, and Bureau of Land Management have worked on GIS files of geologic maps of areas in which they have an interest. Some of this work can be incorporated into UGS GIS products.

Estimate of Investments Needed to Complete This Theme:

There are thirty-nine, 1:100,000 scale (30'x60') quadrangle maps that need to be completed. The seven quadrangles that have already been published in paper format will cost approximately $25,000 per map, for a total of $175,000. The remaining thirty-two quadrangles will range in cost from $48,000 to $216,000 per map, depending on the amount of field mapping that needs to be done, for a total of $3,120,000.

There are 1,100, 1:24,000 scale (7.5') quadrangle maps that need to be completed. The 422 quadrangles that have already been published in paper format will cost approximately $10,000 per map, for a total of $4,220,000. The thirty-two quadrangles completed by UGS in all but GIS format will cost approximately $4,000 per map, for a total of $168,000. The remaining 1,078 quadrangles which have not been started, will cost approximately $59,000 per map, for a total of $63,602,000.

Estimate of Current Allocation of Funding/Resources for This Theme:

The current allocation for completing 1:100,000-scale maps is $100,000/year. The current allocation for completing 1:24,000-scale maps is $30,000/year.

Describe Ways to Fund this Gap:

Most UGS mapping and GIS compilation is completed as cooperative projects between the UGS and the U.S. Geological Survey through the National Cooperative Geologic Mapping Program. Some funds may also be available through other federal, state, and local government agencies that have an interest in particular parts of the state.

Most Appropriate Data Steward:

UGS must maintain and update data, but AGRC can make the digital data widely available through the SGID.

Maintenance Process and Cost:

An estimated $10,000/year (1/4 FTE) is required to maintain and update existing GIS data. This cost will increase as maps are added to the database.

GEOLOGIC HAZARDS

Theme Description:

Geologic hazards include earthquakes, landslides, problem soils, and flooding. These hazards are important to consider in land-use regulation and urban development, and maps depicting the hazards are used by city and county planners, transportation officials, developers, planning and engineering consultants, and many others involved in land-use planning. They are also used by emergency management officials both in attempting to mitigate hazards before emergency events and in planning for response and recovery operations after a geologic hazards event. Public health officials use radon-hazard-potential maps to target their epidemiological studies, as do scientists in the Division of Radiation Control (Department of Environmental Quality). Maps have been completed showing the various hazards at scales ranging from 1:500,000 to 1:24,000. The 1:500,000-scale state maps are useful in depicting the statewide extent of a hazard, but cannot be used by cities and counties in regulating land use. Maps at scales of 1:24,000 or larger are needed for this purpose, and they need to be in digital form for incorporation into local government GIS systems.

Data Sources:

The Utah Geological Survey (UGS) is the main source of geologic-hazards maps as most of them are derived from primary geologic maps (surface exposures) and other data that must be collected in the field. The U.S. Geological Survey, local government geologists and planning departments, and geotechnical consultants also produce these maps. UGS also works closely with the University of Utah Seismograph Stations (UUSS). The UUSS's Utah Earthquake Catalog is the source for all seismicity data (see Map 14-3).

Status:

(1) In 1992 the Governors Office of Planning and Budget funded a cooperative agreement between UGS and AGRC. AGRC digitized or converted five of UGS's hazard maps into digital, GIS format. As a result, statewide coverages are already available in the SGID showing landslides (1:100,000 scale) (see Map 14-4), Quaternary faults (1:100,000 scale), problem soils (1:500,000 scale), shallow ground water (1:500,000 scale), and flooding from lakes and dam failures (1:500,000 scale).

(2) In 2000 a statewide update of the Quaternary faults database was completed with cost-sharing funding from the U.S. Geological Survey National Earthquake Hazards Reduction Program. Data from fault studies conducted in Utah between 1990 and 1999 and published at 1:24,000 and 1:50,000 scales, were added and replaced older, less reliable data (see Map 14-5). The updated database is ready to be incorporated into the SGID.

(3) Liquefaction-hazard-potential maps (scale 1:48,000) are complete for Davis County, Utah County, Salt Lake County, northern Wasatch Front (Weber, Cache, and Box Elder Counties), and central Utah (parts of Juab, Sanpete, Millard, Sevier, Summit, and Wasatch Counties). All but central Utah are in digital GIS format and are already available in the SGID.

(4) The statewide radon-hazard-potential map is complete (1:500,000 scale) but not yet incorporated into the SGID. Site-specific, radon-hazard-potential maps (1:50,000 - 1:100,000 scales) are complete for Sandy (Salt Lake County), Provo (Utah County), southern St. George Basin (Washington County), Ogden Valley (Weber County), central Sevier Valley (Sevier County), lower Weber River area (Tooele County), southeastern Cache Valley (Cache, Davis, Tooele, and Weber Counties), western Salt Lake Valley (Salt Lake County), and Beaver Basin area (Beaver County). Some are in digital form, but none have been incorporated into the SGID.

(5) Folios of geologic-hazards maps at 1:24,000-scale are complete for Davis, southern Grand, Salt Lake, eastern Tooele, western Wasatch, eastern Washington (Springdale), Weber, and Utah Counties. The map folios vary depending on the hazards present but generally include earthquake hazards (liquefaction, surface fault rupture, ground shaking, tectonic subsidence, dam failure inundation, and earthquake-induced landslides), landslide hazards (rock falls, landslides, and debris slides, flows, and floods), flooding (lakes, streams, and shallow groundwater), problem soils (expansive, collapsible and subsidence, gypsiferous, and piping), and radon-hazard potential. Some in are digital form, but none have been incorporated into the SGID. Digital files for Salt Lake County maps are available from the Salt Lake County Development Services Department, and those for Utah County are available through the Utah County GIS Department. Other maps are not available digitally. Geologic-hazard folios are in progress for Cache County, Ogden Valley (Weber County), and the St. George area of Washington County, and all will be digital files.

Standards:

No generally accepted standards are available for geologic-hazards mapping.

Priority:

The UGS internally sets priorities for geologic-hazards mapping. Locations are chosen based on present levels of hazard and risk, and potential for future development.

Total Current Investment in Theme:

Over the past five years, there has been one GIS specialist working full time on this theme.

Contributions by Sector:

The UGS typically participates in projects with other agencies by contributing a cost share of the total project budget. These agencies include the U.S. Geological Survey National Earthquake Hazards Reduction Program, and the U.S. Environmental Protection Agency State Indoor Radon Grant Program.

Estimate of Investments Needed to Complete This Theme:

All on-going and new maps are being compiled digitally by existing GIS personnel (one full-time FTE). An additional 0.5 FTE is needed but no dedicated funding is currently available for this task.

Estimate of Current Allocation of Funding/Resources for This Theme:

There is currently one staff GIS specialist working full time on this theme, funded at $40,000.

Describe Ways to Fund this Gap:

Federal and local government funding may be available for some projects, but in general funding sources are few.

Most Appropriate Data Steward:

UGS must maintain and update data, but AGRC can make the digital data widely available through the SGID.

Maintenance Process and Cost:

UGS periodically updates digital maps as new information becomes available. GIS specialist requirements for maintenance averages less than 0.25 FTE/year ($10,000/year).

GEOLOGIC RESOURCES

Theme Description:

The geologic resources of Utah are subdivided into two broad categories: energy resources and mineral resources. Energy resources include oil and gas, coal, uranium, oil shale, tar sands, and geothermal waters. Mineral resources include a variety of base metal (e.g. copper, lead, and zinc), precious metal (such as gold, silver, and platinum), and industrial mineral (such as limestone, gypsum, and sand and gravel) commodities. Resource occurrence data is compiled at a variety of map scales including 1:24,000, 1:100,000, and 1:500,000. Large-scale mapping is used to characterize resource deposits in detail while smaller-scale mapping is most often used to perform regional and state-wide resource assessments.

Data Sources:

(1) The Energy Resources Map of Utah, published by the Utah Geological (and Mineral) Survey (UGS) in 1983, is the 1:500,000 scale energy resources map of the state.

(2) The UGS maintains a subset of the National Coal Resources Data System (NCRDS), which contains coal resource data for at least 185 Utah quadrangles at the 7.5' scale (1:24,000). Additional digital data is being generated from this database as part of the National Coal Assessment, which is funded by the U.S. Geological Survey.

(3) The Utah Mineral Occurrences System (UMOS) is a digital database of mineral occurrence information that was compiled on a quadrangle base (usually 1:24,000, but occasionally 1:62,500 scale). It was originally part of the national Computerized Resource Information Bank (CRIB), which was later renamed the Mineral Resource Data System (MRDS). A separate name was given to the UGS version because it has been modified from the original MRDS. This database contains information records for at least 8,900 metallic and industrial mineral occurrences, including 2,000 for sand and gravel, and more than 1,000 uranium records. Some data is also included for coal deposits.

(4) The Digital Geologic Resources Atlas (UGS Bulletin 129-DF, 1999) and A Summary of the Geologic Resource Atlas of Utah (UGS Open-File Report 364, 1999) also provide digital mineral resource information for Utah.

(5) Digital geothermal resource information is contained in the Data Release of Low-Temperature Geothermal Water in Utah (UGS Open-File Report 311-DF, 1994).

Status:

See Map 14-6

(1) The conversion and update of existing data into GIS format for the geothermal resources, limestone resources, and oil and gas resources are in progress and should be completed in 2001.

(2) The conversion and update of existing data into GIS format for coal resources, uranium resources, tar sand resources, and oil shale resources has begun, but no firm completion dates have been set.

(3) As time allows, compilation of GIS-format data for high-silica sand resources, gypsum resources, gilsonite resources, phosphate resources, sand and gravel resources, and other commodities will be undertaken. All new projects will be undertaken in GIS format.

Standards:

The UGS follows standards set by the National Cooperative Geologic Map Program, which is headed by the U.S. Geological Survey and the Association of American State Geologists, and that works closely with the FGDC.

Priority:

Geologic resources data are in high demand by many other state agencies, local governments, and private companies. The UGS provides data on the potential for mineral resources development to the state Department of Community and Economic Development. The valuation of mineral resources on School and Institutional Trust Lands maximizes income collected by the state's Mineral Lease Program. This data is also vital when the state is evaluating land trades with the Federal government or considering the creation of new Wilderness lands. Completion of the mapping of energy resources is the current top priority. The second priority is the mapping of those metallic and industrial mineral commodities that are critical to maintaining the quality of life for Utahns. Subsequent future priorities for data mapping and compilation are flexible and will be re-evaluated on an annual basis.

Total Current Investment in Theme:

Over the past five years the level of time spent has varied widely, but on average, there have been at least two geologists (1/4 time) and one geological technician (1/4 time) working on this theme. Annual dollar expenditures have averaged about $30,000.

Contributions by Sector:

The UGS typically participates in projects with other agencies by contributing a cost share of the total project budget. These agencies include the U.S. Geological Survey, the U.S. Department of

Energy, the Office of Energy and Resource Planning, and the Department of Community and Economic Development.

Estimate of Investments Needed to Complete This Theme:

At the current level of effort, it is estimated that it would take eleven years to complete the compilation of energy and mineral resources information for the state. The current $30,000 level of expenditures would have to be inflated annually to keep up with increasing personnel and overhead charges.

Estimate of Current Allocation of Funding/Resources for This Theme:

There is funding for FY 2000-2001 to map the geothermal resources of the state. This project, jointly funded by the UGS, the Office of Energy and Resource Planning and the Department of Community and Economic Development, is funded at approximately $31,000. No dedicated level of funding and effort has been identified for future years.

Describe Ways to Fund this Gap:

The UGS would hope to obtain outside funding to help leverage state monies to complete the compilation of energy and mineral data for the state in a timely fashion. Without outside funding this task will likely take longer than eleven years to complete.

Most Appropriate Data Steward:

UGS must maintain and update data, but AGRC can make the digital data widely available through the SGID.

Maintenance Process and Cost:

An estimated $10,000/year (1/4 FTE) is required to maintain and update existing GIS data. This cost will increase as mineral resource layers are added to the database.

Wildlife Habitat

Wildlife themes consist primarily of: a) species locality data, and b) species habitat data. Although other wildlife-related themes (e.g., Wildlife Management Unit boundaries and hunt unit boundaries) exist, they are not Apriority data layers,@ and are therefore not considered here.

Part A. SPECIES LOCALITY DATA

Theme Description:

Species locality data are developed primarily for threatened, endangered, sensitive, and otherwise rare vertebrate, invertebrate, and plant species. Data are developed state-wide, on a species-by-species basis. All occurrences are mapped as points, however, occurrences are also mapped as polygons (1:24,000 scale) when appropriate. Data available to the public are updated on a quarterly (four times per year) basis.

Data Sources:

Species locality data are developed by the Utah Division of Wildlife Resources (UDWR). Major data sources include: field data collected by UDWR biologists, federal agency biologists, university biologists, and others; museum and herbarium records; published and gray literature; and other existing databases.

Status:

The UDWR=s Utah Natural Heritage Program has recently completed its first round of data development for all federally-listed and state sensitive plant and animal species. Although much has been accomplished, significant work remains to be completed. Future work tasks include: 1) keeping the database current as new species localities are discovered, 2) developing locality data for species that are rare but are not yet listed as threatened, endangered, or sensitive, 3) quality-controlling the database, 4) re-working older portions of the database (methodology has changed over the years), and 5) conducting field surveys as data-gaps are identified.

Development of species locality data will always be an on-going process. Myriad wildlife surveys are conducted each year, species are introduced / re-introduced to new areas, species naturally colonize new areas, historic habitats are destroyed or altered, and so on. Existing species locality data layers are already invaluable tools for impact analysis, research, and wildlife management. Future iterations of these data will provide even more information to those who need it.

Standards:

The UDWR follows data development standards set by the Association for Biodiversity Information, The Nature Conservancy, and the Network of Natural Heritage Programs. FGDC standards are followed for metadata development.

Priority:

Species locality data layers are of extremely high priority. The UDWR functions as a repository for Utah biodiversity information, and as such provides standardized data to federal agencies, state agencies, researchers, non-profit organizations, and the public sector. Once it is known where threatened, endangered, sensitive, and otherwise rare species occur, impacts to those species can minimized or avoided, while still allowing development to occur. It is our hope that our species locality data layers will play a role in precluding future listings (and consequent restrictions) under the Endangered Species Act.

Total Current Investment in Theme:

In excess of $500,000 have been spent to date for the development of species locality GIS data and associated tabular data.

Contributions by Sector:

Major contributors to this effort include the Utah Reclamation Mitigation and Conservation Commission, the State of Utah, the United States Fish and Wildlife Service, the United States Bureau of Land Management, the United States Forest Service, the Association of Biodiversity Information, and The Nature Conservancy.

Estimate of Investments Needed to Complete This Theme:

The development of species locality data layers occurs on an on-going basis, as data become available and species distributions change. This theme will, therefore, never be Acompleted.@

Describe Ways to Fund This Gap:

Funding for future species locality data development would come from partnerships between the state, governmental agencies, and non-profit organizations who have a need for complete, accurate, and standardized locality data for Utah=s threatened, endangered, sensitive, and otherwise rare species.

Most Appropriate Data Steward:

The Utah Division of Wildlife Resources acts as a repository for Utah biodiversity information, and has statutory authority to manage Utah=s wildlife species. It is therefore the most

appropriate data steward.

Maintenance Process and Cost:

Data are updated on a continual basis. Data layers available to the public are updated on a quarterly (four times per year) basis. Maintenance costs are not known at this time.

Part B. SPECIES HABITAT DATA

Theme Description:

Species habitat data are developed primarily for Ahigh-interest@ wildlife species, predominately game species and species of conservation concern. In addition, UDWR has recently developed a draft data-layer representing areas of essential wildlife habitat that are currently at-risk from development or other impacts. With the exception of the essential wildlife habitat data layer, which is a combination of habitat for all wildlife species, habitat data layers are developed on a species-by-species basis. All species habitat data layers are developed state-wide, and are mapped as polygons at a 1:100,000 scale. Data layers available to the public are currently updated on an irregular basis.

Data Sources:

Species habitat data are developed by UDWR. Major data sources include species occurrence data, vegetation (land-cover) data, range-trend data, and the best professional judgement of field biologists.

Status:

The UDWR is currently in the process of updating its species habitat data layers. Some of these data layers have not been updated for a number of years, however, and may be inaccurate in places. To complete our updates, the following tasks are necessary: 1) revise our standard methodology for developing wildlife habitat GIS data layers, 2) update existing habitat data layers using the new methodology, 3) quality-control and edge-match the recently updated habitat data layers, and 4) conduct field studies and surveys as data-gaps are identified.

Development of species habitat data will always be an on-going process. Myriad wildlife surveys are conducted each year, species are introduced / re-introduced to new areas, species naturally colonize new areas, historic habitats are destroyed or altered, and so on. Existing species habitat data layers are already invaluable tools for impact analysis, research, and wildlife management. Future iterations of these data will provide even more information to those who need it.

Standards:

The UDWR follows data development standards developed in-house. FGDC standards are followed for metadata development.

Priority:

Species habitat data layers are of extremely high priority. The UDWR functions as a repository for Utah biodiversity information, and as such provides wildlife data to federal agencies, state agencies, researchers, non-profit organizations, and the public sector. Once it is known which areas are essential habitat for Utah=s wildlife species, impacts to those areas can minimized or avoided, while still allowing development to occur. It is our hope that our species habitat data layers will play a role in precluding future listings (and consequent restrictions) under the Endangered Species Act.

Total Current Investment in Theme:

The UDWR has been mapping wildlife habitat areas for over thirty years. The current investment in our wildlife habitat data layers is therefore unknown, but is unquestionably significant.

Contributions by Sector:

Funding for wildlife habitat data layers has been provided primarily by the State of Utah.

Estimate of Investments Needed to Complete This Theme:

The estimated cost to improve our current methodology and update all existing wildlife habitat data layers is $200,000. This cost does not include any additional field surveys that may be needed.

Describe Ways to Fund This Gap:

Although the UDWR is committed to updating all existing wildlife habitat data layers, funding of approximately $100,000 from the I-Team is needed to complete this work.

Most Appropriate Data Steward:

The Utah Division of Wildlife Resources acts as a repository for Utah biodiversity information, and has statutory authority to manage Utah=s wildlife species. It is therefore the most appropriate data steward.

Maintenance Process and Cost:

Data are currently updated on an irregular basis. Maintenance costs are not known at this time.

Climate

The basic climate themes include monthly and annual summary, spatial distributions of observed temperatures and precipitation and themes calculated from the observed values. The temperature themes are for maximum and minimum temperatures. The precipitation themes include total rainfall and snowfall. In addition, calculated values for various derived themes include average temperature, evapotranspiration, heating and cooling degree days for base 65, and growing degree days for base 40 and base 50 degrees.

Theme Description:

This theme includes climate maps of average monthly and annual, spatial distributions for the several climatic thematic layers. Examples of the Average January Minimum Temperatures for Utah and the Average Maximum Temperatures for Utah thematic layers for the 1961-1990 period are shown as an attachment. These and other climatic layers would be updated to the new normal period of 1971-2000.

Data Sources:

The Utah Climate Center regularly archives weather and climate data for various weather station networks in Utah and for much of the world. Data sources for this project include all temperature and precipitation from the Utah Climate Center at Utah State University in Logan, UT, and additional data as necessary from the National Climatic Data Center in Asheville, NC.

Status:

The 1971-2000 observed data for temperature and precipitation have been observed and recorded. These data, with the exception of the October through December months of the year 2000, have been collected and quality controlled. The October through December data are presently being collected, assembled and quality controlled. When these data are included, the process of developing thematic representations for the parameters can be started.

Standards:

The Utah Climate Center follows observational and data standards set by the World Meteorological Organization (WMO) and National Oceanic and Atmospheric Administration (NOAA). U. S. Geological Survey mapping standards are applied to all spatial distributions produced by the Utah Climate Center.

Priority:

Mapping priorities are set by the State Climatologist for Utah and the Advisory Committee for the

Utah Climate Center. The Committee meets twice each year to set priorities for the Utah Climate Center, including mapping of climatic parameters. These persons consider funding for the individual thematic layers as well as the needs of private individuals, local and State entities, and federal agencies. From highest to lowest, the priorities for several thematic maps include: annual and monthly maximum temperature, annual and monthly minimum temperature, annual and monthly total rainfall, annual and monthly snow depth, calculated annual and monthly average temperature, calculated annual and monthly evapotranspiration, calculated annual and monthly heating degree days, calculated annual and monthly cooling degree days, calculated annual and monthly growing degree days (base 50), calculated annual and monthly growing degree days (base 40), seasonal maps for the parameters listed as needed, and additional applied maps such as plant hardiness and freeze-free season.

Total Current Investment in Theme:

Presently temperature and precipitation data are being assembled and quality controlled. Computer hardware, software, and expertise have been developed with which to create the thematic layers.

Contributions by Sector:

A dollar amount is not available although both State and Federal agencies spend significant amounts annually to collect and map climate information.

Estimate of Investments Needed to Complete This Theme:

Funding is the only need necessary to complete the climatic thematic layers.

Estimate of Current Allocation of Funding / Resources for This Theme:

A quite firm estimate to create the 1971-2000 thematic layers is: $3,000 to organize and set up the data for each layer, and $2,000 for the mapping of each layer for each year and month. For example, for temperatures there would be a $3,000 set up cost, and then an additional $2,000 for each of the maximum, minimum and average temperature maps created. These combinations are required to meet users needs. The total cost would be $269,000.

Describe Ways to Fund This Gap:

Undetermined at this time.

Most Appropriate Data Steward:

Most appropriate data steward is the State Climatologist at the Utah Climate Center in Logan, Utah.

Maintenance Process and Cost:

Once thematic layers have been created and stored in digital format there is little or no maintenance required. Maintenance for computer servers and storage facilities for the digital themes as well as plotters to produce hard copy of thematic layers when necessary, is estimated at $500 per month or $3,000 annually. These costs can be shared at the University.

Section 17.

Ground Cover

This section is pending.

Section 18.

Land Use

Theme Description:

The State of Utah's population took 113 years to grow to a total of two million residents, however, it may only take another 30 years for the State's population to double. As the State's population grows, quantifying, monitoring, analyzing effects of urban growth, and managing land use becomes increasingly important.

In Geographic Information Systems (GIS) applications, the use of land surfaces by man for human activities is referred to as Land Use, while the natural and manmade features of the land itself are referred to as Land Cover. Whether the data is to be used for new highway construction planning, habitat protection, or the location of a new school, more and more government officials are relying on LULC data to help their planners and administrators provide them with the information they need to make important decisions.

The demand for large-scale LULC information has increased recently, especially in rapidly growing metropolitan areas. Many Federal, State, regional, and local planning agencies require up-to-date LULC information for various applications. These applications include modeling urban growth, determining land suitability for future development, monitoring how land use changes affect the environment, understanding land use patterns, and developing policies concerning land use development.

To meet the needs of State and local government's data must be current and detailed enough to provide the resolution needed for the environmental and urban analysis, planning, and management. In addition to currency and accuracy the data must also be of sufficient detail so that the entities utilizing this information can make intelligent decisions.

Currently, there is a layer in the SGID which depicts a comprehensive effort to map water-related land use (LUWRU) for the entire state. This data layer is used for preparing hydrological inventories and conducting other water-related studies, although it has proven useful for a wide variety of other land use applications.

Data Sources:

The primary source is the 1:24,000-scale high-resolution LULC data presently being produced by the U.S. Geological Survey's National Mapping Division. Typically, the LULC features are collected using 1-meter resolution digital orthophoto quadrangles. Ancillary data sources, such as aerial photographs, USGS-scale quadrangles, and information derived in the field are used to help enhance the interpretation and classification of the land surface features.

LUWRU is produced under a mapping program, through the Division of Water Resources. The inventory is conducted by river basin and updated on an eight-year cycle.

Status:

At present there is no 1:24,000-scale high-resolution LULC data for the State of Utah.

The most current version of LUWRU, with basins updated in 1992 through 2000, is available in the SGID at 1:24,000 scale.

Standards:

USGS requirements for collecting high-resolution LULC features include minimum mapping unit between 2.5 and 5 acres and a minimum polygon width of 125 feet.

The identification of LULC categories follows a modified Anderson classification system (Anderson 1976) developed by the USGS, National Mapping Division, in Denver, Colorado. Currently, the USGS is mapping LULC features down to level 6 of the hierarchal classification system which contains over 75 categories. The LULC data are compiled by 1:24,000-scale quadrangles using USGS-developed software and can be merged to form a seamless data set for specific project areas

The standards for LUWRU are found in *A Water-Related Land Use Inventory of the Bear River Basin*, Utah Division of Water Resources, 1991. All digitizing was performed on USGS 7.5 minute quadrangle paper base maps.

Priority:

Priority for high-resolution LULC is Statewide. The Utah Geographic Information Systems Advisory Council (GISAC) has the authority to provide the leadership in developing a systematic approach to State wide coverage of LULC.

Total Current Investment in Theme:

None for LULC, however a fifteen year investment by the State of Utah for LUWRU.

Contributions by Sector:

LULC data will be used by a variety of single entities and consortiums of government, industry, local entities. The contributions to begin and complete LULC for the State need to be combined from a variety of sources. This effort will require a long-term committed effort at various levels of government and should be overseen by GISAC.

The State Division of Water Resources is responsible for the development and maintenance of LUWRU.

Estimate of Investments Needed to Complete This Theme:

To have complete coverage of high-resolution LULC data for Utah would cost approximately $7 million. This is based on an average cost of $4,500 per quad for the LULC multiplied by the 1,542 1:24,000-scale quadrangles that cover Utah.

Another consideration when considering the cost for statewide production of high-resolution LULC is land ownership pattern. In Utah the approximate ownership is:

State 11%
Private 21%
Federal 68%

LUWRU is complete at this time, but must be maintained on an eight-year cycle.

Estimate of Current Allocation of Funding / Resources for This Theme:

None for LULC.

Describe Ways to Fund This Gap:

The costs for this Theme could be developed using a percentage of ownership, within the State or based on immediate needs of either the State, Private or Federal. In order to accomplish the initiation and completion of this Theme a long term strategy will need to be developed that will see the completion once the work begins.

Most Appropriate Data Steward:

The Utah Automated Geographic Reference Center (AGRC).

Maintenance Process and Cost:

Some of the high-resolution LULC data sets would require a scheduled maintenance because of urbanization, etc. However, the more remote areas and areas such as national parks might require a minimum of maintenance.

LUWRU is maintained and updated on an eight-year cycle by river basins. This must be done in order to show the change in the water-related land use, due to the increase in population and other factors.

Soils

Theme Description:

The National Cooperative Soil Survey (NCSS) is a nationwide partnership of Federal, regional, state, and local agencies and institutions. This partnership works together to cooperatively investigate, inventory, document, classify, and interpret soils and to disseminate, publish, digitize, and promote the use of information about the soils. The Natural Resources Conservation Service (NRCS) is responsible for the leadership of soil survey activities of the U.S. Department of Agriculture, and for the leadership and coordination of other NCSS activities. Additional information about the NCSS is given in the NRCS General Manual Title 430, Part 402.

Two themes are being developed for soils: Soil Survey Geographic (SSURGO) Data Base, and State Soil Geographic (STATSGO) Data Base.

1. SSURGO is the most detailed soil map theme developed for counties, parts of counties, or other administration boundaries. The Natural Resources Conservation Service has responsibility to coordinate the development of the soil survey databases for the private lands, Native American and State administered lands in Utah, and public areas with cooperative agreements. BLM, USFS, and NPS have soil data development responsibility for public land administered by their respective agencies. The soil survey program has been in progress since 1899. This map theme was designed for use by landowners, local units of government, planners and land use managers.

Field mapping methods using national standards are used to construct the modern soil survey maps in the SSURGO database. Mapping scales in Utah generally range from 1:20,000 to 1:31,680. SSURGO maps are digitized at a standard scale of 1:24,000, and duplicates the original soil survey maps. The map base used is an orthophotoquadrangle that meets national map accuracy standards.

2. STATSGO provides a statewide general soils theme. STATSGO is generalized from SSURGO maps and other soil survey information. The map scale for the STATSGO map is 1:250,000. The STATSGO map theme was designed for state or large area planning and management in Utah and between adjacent states. The map base used is the 1:250,000 scale USGS Topographic Quadrangle. The current version was created in about 1985. Updates to this theme are currently in work by NRCS, and estimated to be complete by December 2002.

Data Sources:

The primary source for both soil themes is published or other detailed soil survey reports that meet national data and map accuracy standards. The Status Map for SSURGO displays soil survey areas in digital map development and areas that are certified.

Status:

1. The SSURGO coverage is about 50 percent complete for private and some public land areas (Section 19, Map 2). The status map represents progress towards a first generation certified digital soil survey map that began in 1996, and that adhered to national map accuracy standards. A few areas in Utah have soil surveys in work and a few areas are without soil survey information and are planned in the future. Soil Survey Status map (Section 19, Map1) displays the status of the areas planned for soil survey. Schedules for completion and estimated costs are included in the Estimate of Investment and Estimate of Current Allocation of Funding.

Standards:

The NCSS standards used in the development of both soil data themes are at the web sites listed below. Public land areas managed by the Forest Service, Bureau of Land Management, and National Park Service may have additional local standards.

- Soil Data Subcommittee controls the development of the FGDC soil digital standard (NRCS): http://www.statlab.iastate.edu/soils/fgdc-sds/

- Soil Survey Standards including mapping, STATSGO, and FGDC map accuracy standards are listed at the following web site within a link called Standards for Soil Survey: http://www.statlab.iastate.edu/soils/nssc/

- National Soil Survey Handbook, parts 647.07, 648.03, and 648.04 describes the NRCS digitizing standards, and archiving of the soil map information. http://www.statlab.iastate.edu/soils/nssh/

Priority:

The soil survey theme (SSURGO) has been one of the highest priority data layers used by state and local units of government, landowners, and land use planners for many years. Proper land use and planning is guided by the variety of soils for its value as a limited natural resource.

Total Current Investment in Theme:

Part of the recent cost in creation of the SSURGO Data Base theme from published surveys was in the procurement of digital orthophotoquadrangles (DOQ). DOQ procurement cost was shared by a number of federal agencies (BLM, FS, NRCS, FSA, USGS), State of Utah, and some local units of government. Each quadrangle was estimated to cost about $3,300 per quadrangle and since 1996 the total combined cost for all agencies in Utah is estimated at about 5 million.

The total investment cost for initial mapping and development of the SSURGO Data Base theme is about 35 million dollars.

Contribution by Sector:

See above for DOQ procurement. In addition, Summit County provided about $24,000 in 1999 to digitize the Summit SSA for planning needs for the 2002 Winter Olympics. This soil survey area is still in work and planned for SSURGO Data Base certification 2001. Some areas administered by the FS, BLM, and NPS have digitized maps and some soil information. These areas are only 75 percent complete due to needs for soil correlation and data base development.

Estimate of Investments Needed to Complete This Theme:

Soil survey mapping and SSURGO Data Base development for areas in Utah are not complete. For the current status of soil survey in Utah, refer to the map, Status of Soil Survey. Approximately 15 million acres remain to be initially mapped, to have mapping updated, data sets built, and certified before inclusion in Utah's SSURGO Data Base.

Estimated costs to complete the detailed soil survey and develop a SSURGO Data Base theme is about 18.75 million dollars

Estimate of Current Allocation of Funding / Resources for This Theme:

NRCS and other federal agencies are reliant on the national budgets remaining at about the same level. The funding for NRCS allows for about 10 soil scientists and this is expected to continue. Soil Scientist funding for progress soil survey averages about 40,000 acres per person per year or 400,000 acres. The total estimated allocation of funds for the 400,000 acre per year goal for soil survey is about $500,000 for mapping; $50,000 for correlation, data quality review, and lab data; and about $50,000 for map materials, compilation, and digitizing. This total is about $600,000 annually to support soil survey mapping and SSURGO Data Base development at its present level.

Describe Ways to Fund This Gap:

The number of soil scientists available for soil survey mapping has been reduced over the past 10 years. Utah has about 10 soil scientists mostly with NRCS who inventory the soil resources. Development of the initial coverage of SSURGO will require time or increased mapping capacity with more people. BLM, FS, NPS and State of Utah could identify positions for soil scientists to work with NRCS in needed areas. For areas administered by BLM and mapping by NRCS agreements for shared resources could allow for the use of BLM digitizing as a means to share cost. Other agreements to share agency resources in addition to dollars would shorten the length of time needed for initial coverage completion, but the few numbers of soil scientists is really the barrier to rapid SSURGO Data Base development.

Most Appropriate Data Steward:

1. NRCS is the primary data steward for the soil survey data base (SSURGO). The national

archive at the web site below maintains a list of the survey areas with digital data, meta data, access to the data, and guidance documents for use of the information.
http://www.ftw.nrcs.usda.gov/ssur_data.html

2. NRCS is the primary data steward for the general state soil data base (STATSGO). The national archive at the web site below maintains the current version of the general soil survey information that is seamless between states, meta data, access to the data, and guidance documents for use of the information.
http://www.ftw.nrcs.usda.gov/stat_data.html

Maintenance Process and Cost:

Maintenance of the soil survey (SSURGO) and state soil (STATSGO) databases will be through normal soil survey updates to areas that need new or refined information by the responsible agency. Costs are a part of the normal operational activities and the partnering arrangements identified with a Memorandum of Understanding for the conduct of a soil survey.

High-Speed Telecommunications Infrastructure

Theme Description:

A high-speed telecommunications infrastructure that allows businesses and the state's residents to access and fully use Internet capabilities is a critical component for the state's continued economic development and growth. The telecommunications infrastructure includes fiber optic networks, microwave, DSL service, and cable services.

Data Sources:

1. Utah Education Network (UEN)—Fiber, T1, Microwave
   Format: Converted to ArcView
   Version: 2001
   Source: George Brown, UEN

2. Incumbent Local Exchange Carriers (ILECs) Service Area map
   Format: Paper to be digitzed
   Version: 1997—revision for 2001-ownership changes not completed
   Source: Nancy Gibbs, Utah Rural Telecom Association

3. Statewide Fiber and Microwave—Existing and proposed
   Format: Paper to be digitzed
   Version: 2000
   Source: Utah Rural Telecom Assoc.

4. State Consortium Video Conferencing Network
   Format:
   Version: Jan. 2000
   Source: State ITS

5. Qwest – Statewide and Salt Lake City IOF Fiber and Central Office
   Format:
   Version: Jan. 2001
   Source: Qwest
   Michael Dalebout 237-7634
   Have requested (2/2001) list of Central Office addresses

6. Questar – Microwave Site and Network
   Format: Paper
   Version: 2001
   Source: Questar

7. State Wide Area Network – Microwave Facilities
   Format: Arc/Info
   Version: 1997
   Source: Utah Division of Information Technology

8. Community-specifc data
   Format: In process of collecting information
   Version:
   Source: ILECs and CLECs in state for high-speed telcommunications services available
   Real estate brokers and business and industrial park managers for wired capacity or capacity available at the door.

Status:

Utah Educational Network maps – completed.

ILEC Service Area map and Statewide Fiber and Microwave map—have hard copy; in process of acquiring digitized copies; may have to digitize.

Rest of maps listed above need to be digitized.

Standards:

All data distributed or used on planned web sites will be documented using FGDC developed and approved National Metadata Standard. The CIO's office and AGRC will coordinate efforts to agree on minimum attribute standards for these data themes.

Priority:

Digitize hard copy maps.

Develop database with information about the types of high speed, broadband services available.

Total Current Investment in Theme:

UEN: $200
AGRC: $1,000
ITS: $1,000

Contributions by Sector:

State Office of Education: $200.
State Chief Information Officer's Office—coordinating data collection.

AGRC: Preparation of digitized files.

Estimate of Investments Needed to Complete This Theme:

Data collection and digitizing of maps - $10,000.

Estimate of Current Allocation of Funding/Resources for This Theme:

AGRC has limited funding from legislative appropriations to further develop these layers.

Describe Ways to Fund This Gap:

Potential contribution of digitized maps of ILEC service area and fiber network from the Utah Rural Telecom Association.

Most Appropriate Data Steward:

The Utah Automated Geographic Reference Center (AGRC)

Maintenance Process and Cost:

Information would be reviewed annually by the Office of the State Chief Information Officer. It is anticipated that the demand for high speed, broadband communication will continue to increase and additional capacity/services will be developed. Update costs would be minimal.

Critical Facilities/Infrastructure

Theme Description:

Critical facilities and infrastructure are human-built systems that are essential to the safety, security, health and economic well-being of our modern society. These systems are vulnerable to disruption by natural disasters or human caused events. Many critical facilities are part of the system for responding to disrupting events. Examples of critical facilities and infrastructure include: police and fire stations; hospitals and other medical care facilities; schools; transportation systems; energy distribution; water distribution; telecommunications.

Planning for and responding to threats to critical infrastructure, including the use of key response resources at essential facilities, can be significantly enhanced through spatial representation.

Data Sources:

Primary sources may include the following. Other sources need to be identified.

Utah Division of Comprehensive Emergency Management

Utah Department of Public Safety

Utah State Office of Education

Utah Department of Transportation

Utah Department of Health

Utility Companies

Federal Emergency Management Agency

US Department of Transportation

US Department of Energy

US Bureau of Reclamation

Federal Critical Infrastructure Assurance Office

Counties

Status:

Utah Division of Comprehensive Emergency Management (CEM) has compiled the following state-wide data:

Location of police and fire stations
Provided by local jurisdictions
Completed YR 2000, Needs to be maintained

Location and capacity of primary care hospitals
Provided by Utah Department of Health
Completed YR 2000, Needs to be maintained

Major highways and bridges
Provided by Utah Department of Transportation.
Completed, Needs to be maintained

TIGER Roads for each county
Will replace with better data as it becomes available.

TIGER Railroad Lines
Will replace with better data as it becomes available.

Electrical distribution long lines and major substations
Provided by electric utility companies.
Completed (Nearly complete), Needs to be maintained.

Major Natural Gas Pipelines
Currently only "long lines" provided by utility companies.
Completed (?), Needs to be maintained.

Dams
Provided by US Environmental Protection Agency, Office of Water.

NEEDED:

Major Water Distribution Systems
This theme requires the most work of any in this section. There are approximately forty Water Districts in the State. We will contact each of them to get the most current and accurate information.

Major Telecommunications Systems
This theme is part of critical facilities but is covered in Telecommunications section (Section 20).

Standards:

All data will be documented using the FGDC Metadata Standard.

Priority:

These facility and infrastructure themes are required by CEM, FEMA, DOT, the counties and many other users, making them a high priority.

Total Current Investments in Theme:

It is impossible to estimate what the utilities and other agencies have spent so far but CEM has expended approximately $50,000.

Contributions by Sector:

In addition to utilities and state agencies, counties have GPSed facility locations and provided other information.

Estimate of Investments Needed to Complete This Theme:

We estimate that it would require two staff-years to complete these themes.

Estimate of Current Allocation of Funding / Resources for This Theme:

Ad hoc contributions from the participants mentioned above.

Describe Ways to Fund This Gap:

Legislative appropriation or other revenue source for one FTE.

Most Appropriate Data Steward:

CEM is the logical steward for the facilities such as police, fire, hospitals, etc. AGRC and CEM

would coordinate a variety of stewards for the other themes maintained by state, federal, and local governments and the utilities.

Maintenance Process and Cost:

One FTE (1/2 at CEM and ½ at AGRC) is required to maintain these themes.

Section 22.

Environment

Description

The Department of Environmental Quality has made information available to the public on sites and facilities that have an environmental interest to the State of Utah. This includes environmental permitting and compliance, facility spatial information, and industrial category data. Information is available in the following areas:

Air emission sources
Brownfields sites
Compost sites
Drinking water systems
Ground water sites
Hazardous waste small quantity generators
Hazardous waste large quantity generators
Incinerators
Landfills
Multi-permitted sites
Post closure care sites
Radioactive materials sites
Superfund sites
Surface water sites
Toxic release inventory sites
Transfer stations
Underground storage tanks
Used oil recycling facilities
Voluntary clean up sites
X-ray equipment sites

Spatial coordinates are available for the twelve thousand sites regulated by the Department of Environmental Quality. On going efforts, via EDRI ARC/IMS, is underway to display the data spatially.

Appendix 1.

MOU goes here..

Appendix 2.

Implementing a new paradigm

An Outcome of OMB's Information Initiative
"Collecting Information in the Information Age"

Background:

Governments at all levels (federal, state, local, and tribal) manage complex natural and social environments. They build streets, schools and airports; protect public health and the environment; and provide for public safety and disaster relief. Legislative bodies, executive branch decision-makers, and private sector businesses require accurate information about the communities, people, businesses and habitats affecting and affected by their decisions. This information about buildings, forests, waterways, weather, crime patterns, disease outbreaks, and traffic patterns is spatial data.

Spatial data has long been part of government and business processes, but its value and ubiquity are only now becoming universally recognized because of new technology that can handle large volumes of data and interoperability standards. Approximately 80% of all data used in business and government has a locational component. Much of this information has been developed over the past 30 years to serve narrow parochial missions (such as repairing streets, assessing property taxes, or dispatching emergency services). Little of it is integrated and anchored to other geographic information. With the Internet's distributed architecture and the Web's browsing and display capability, users inside and outside of government are demanding increased data pooling and sharing, based on market-driven interoperability standards.

There are a vast number of applications for geospatial data that would help Government make better decisions, conduct better operations, provide better customer service, and be more accountable. Banks, utilities, insurance companies, police departments, and other public and private sector organizations increasingly find new uses for location-based services, remote sensing, GPS and other technologies to serve citizens and customers better.

The Federal Government has a lead role to play in coordinating the development, access and use of spatial information. This role requires Federal agencies to exercise leadership and cooperate with State, Local and Tribal authorities, the private sector, and academia to develop a coordinated "National Spatial Data Infrastructure" (NSDI). An NSDI integrated across jurisdictions can be a key component for enabling E-Government and E-Commerce to flourish.

Historically, government budget authorities treated spatial data and its supporting infrastructure as data processing expenses to be funded from current year operating budgets. However, as spatial applications began to extend into nearly every aspect of our lives, they began to cut across organization lines and exceed the capacities of single department missions and budgets. Like the national road system, each level of government has an appropriate role, as does the private sector. No one agency or level or government can or should build or fund its spatial data and decision support needs alone.

Spatial Infrastructure has become an essential part of the nation's capital infrastructure. Despite this fact, no widespread capital financing model for GIS has emerged. Spatial infrastructure, an

intergovernmental capital asset, continues to be funded by "stovepiped" annual appropriations. This mismatch between the need for long-term capital financing and the current reliance on annual appropriations remains one of the chief obstacles to the attainment of the NSDI.

Government entities at all levels, as well as private sector organizations, are making major investments in spatial data needed for operations. They fulfill governmental data mandates supporting essential public services and policy goals (such as clean air and water, efficient transportation, safe streets, emergency relief, and urban and rural sustainability). The costs of data stewardship for municipalities, water districts, and other local, state and tribal government organizations are significant. The challenge for all levels of government is to develop common criteria for spatial infrastructure investments, align annual public and private budget cycles more effectively, and pool and leverage spatial investments.

In addition, if spatial data is an important part of the nation's information infrastructure, it should be constructed, maintained, renewed, and budgeted for over its long-term life cycle as any other critical capital asset. Alternative financing mechanisms to the current annual appropriation "stovepipes" are needed.

A New Paradigm Emerges

We have an historic opportunity for all levels of government, and the private and nonprofit sectors to establish a new paradigm.

- Partnerships among State, local, Tribal, and Federal authorities, and the private sector could help share costs by capturing economies of scale and aligning their pooled capital investments in standardized spatial data layers and content.
- Mechanisms for allocating and sharing data collections and costs efficiently effectively and fairly would encourage data development and stewardship at the right place by the right organization.
- All investors in spatial infrastructure should use common criteria when investing in spatial infrastructure. Criteria would include Federal and market standards for interoperability, data format, and metadata and content standards, along with principles for public access, data security, privacy and other goals affecting governmental and business data.
- Creative financing outside of government appropriation cycles, such as infrastructure bonds or other financial products, could supplement and de-politicize the funding process, providing the liquidity to deploy and sustain shared spatial infrastructure,

In this paradigm, no Federal program or initiative needs to dictate policy to States, local, and tribal jurisdictions, or the private sector, for the NSDI to develop. Rather, all parties collaborate as partners in consortia operating in states, regions, industries or interest groups. This strategy implements the NSDI by aligning spatial infrastructure investments using common investment criteria.

Implementing the New Paradigm

As part of OMB's Information Initiative "Collecting Information in the Information Age", OMB

recently completed a series of public Roundtables exploring how to improve the quality of the spatial data Government collects while minimizing the collection burden. Dialogue focused on the need to overcome the financial and institutional barriers to the sharing of spatial information among Federal, State, local, and tribal entities, and the private sector. In response to participants' recommendations, OMB (in cooperation with the Federal Geographic Data Committee (FGDC), National Performance Review (NPR), Council for Excellence in Government, Urban Logic, and other public and private sector stakeholders) has invited the spatial data community to begin several implementation actions.

- Implementation Teams (I-Teams). I-Teams will organize institutions in their state or region to build statewide portions of the NSDI. Already, New Jersey, Kentucky, North Carolina, Oregon and Metropolitan New York City have committed to establish an I-Team. Each Team, aligning the needs and resources of its State, local, tribal, Federal, and private sector partners, will prepare a comprehensive plan for compiling, maintaining, and financing spatial infrastructure in its Team area. It will identify the needs and responsibilities of the partners, align and leverage resources, and establish detailed timetables and performance measures.

- A Federal Partners Team**.** Consisting of senior officials of OMB, FGDC, USGS, NOS/NGS, Census, DOT, BLM, NRCS, and EPA, and other interested agencies. The Federal Partners Team will focus Federal agency efforts, respond to and coordinate with I-Teams, and explore new alternatives to develop needed standards

- A Financing Solutions Team (FSTeam). The FSTeam will identify and recommend intergovernmental and public-private financing alternatives to support the NSDI and the I-Teams.

- A Technology Advisory Group (TAG). Open to all vendors and led by the Open GIS Consortium, TAG will be a resource for I-Teams. It will keep I-Teams and Federal Partners informed of technology innovations and be available to solve common technology challenges. By working with I-Teams to develop and test new products and solutions, TAG will accelerate dissemination of knowledge of the substance and process of building interoperable networks and open systems. TAG also will help the FSTeam use standards to develop strategies for procurement, budgeting and capital pooling.

The Financing Solutions Team

The FSTeam will act as investment advisors to the I-Teams and the Federal Partners. It will research and structure ways to improve how spatial infrastructure investments originate, perform and align.

Make A Business Case. The FSTeam will develop a business case, value proposition and financing options for the I-Teams and Federal Partners to use in preparing their working plans and budget proposals. It will help the geospatial community to explain to legislative bodies the benefits of aligning investments to achieve the NSDI.

Explore Better Use of Existing Appropriations Structure. Currently, almost all spatial

information budget processing is annual. The FSTeam will explore better ways to fund spatial infrastructure investments by aligning and optimizing appropriations, budget, and procurement cycles at all levels of government, including interagency and cross-cutting mechanisms. It will analyze cash flows and returns on investment, and compare costs and benefits. It will develop common investment criteria and explore ways to pool and leverage spatial investments.

Suggest New Funding Mechanisms. The FSTeam will use the cash flows, preliminary investment criteria and other results generated by its research and work to design sustainable capital financing options, such as infrastructure bonds or revolving funds. In the case of other national infrastructure and community development activities (such as roads, housing stock, airports, and small business development) the Federal government has used financial intermediaries (such as state bond banks, Fannie Mae, Community Development Corporations, and Small Business Investment Companies) to pool and administer local public and private resources through national investment criteria.

Electronic meeting support, knowledge management and other Web-based collaboration tools will be available to members of the FSTeam. This should minimize the need for face-to-face meetings, conserve the valuable time of its distinguished members, and begin the process of creating a public and private financing toolkit.

Legislation or executive guidance may be needed to authorize specific plan elements (for instance, public and private financial incentives that support the long-term sustainability and value proposition of the NSDI). In such cases, the FSTeam will provide the I-Teams and Federal Partners with suggestions for legislation, executive guidance and supporting documentation reflecting the knowledge of all Teams.

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Appendix 4.

Last revision by AGRC, August 24, 1999
HTML update February 2, 2000 [Accuracy Statement]
HTML update November 14, 2000 [S_UNIQUE] dropped in favour of [CO_UNIQUE] & [S_FIPS]
[S_SURFWIDTH] added

Transportation Data Model Share-Code items and defintions

(Formerly known as the Canyon Country PartnershipTransportation Share-Codes)

After several meetings, discussions and all night brainstorming sessions, these share codes have found a new home with the Utah Automated Geographic Reference Center (AGRC). All of these activities have lead to a number of changes in the transportation share codes, originally devloped by the Canyon Country Partnership (CCP) geographic data committee. Alot of hard work and effort went into the orginal concept and design of these share codes; the folks at CCP should take pride in thier efforts. The CCP is a group of GIS practicioners from South Eastern Utah representing local, county, state, and federal government agencies along with the private sector as well.
Some of the changes are subtle, but for those of you familiar already with the share codes, the most noticable change is that of the actual names of the items. The orginal share. prefix has been changed to simply s_. This should eliminate problems encountered by ArcView users. Other changes include more concise evaluations of the items and changes to the byte-wise definitions with respect to the INFO data table. A copy of the INFO data table in export format as well as a copy of the dbase file is available. Plans include making a data dictionary for GPS data collecting available too.
This transportation model is intended to work with the arc segments. ARC/INFO route systems would provide for more efficient applications, but to maintain compatibility with the greatest number of users the Arc model is used. Eventually, these share codes will adopt the UDOT route system scheme when it is fully defined.
These codes were developed by reviewing other transportation models such as the NSDI transportation model, USDA Forest Service Primary Management Objectives and Transportation Management System, UDOT transportation model. It was developed by brain storming in groups with diverse transportation system needs at Canyon Country Partnership an Utah Geographic Systems Advisory Council (GISAC) meetings.
This model is well thought out but it isn't perfect. It is adaptable. Change is inevitable and largely painless if we have correctly identified the most important entities and attributes involved with transportation. Please provide comments and bug reports on the share code discussion area to help us fine tune the codes.
This model is not intended to be restrictive. It is considered a minimum set for a basic transportation model and for data sharing. Participating agencies are encouraged to maintain additional attributes to meet local needs. If fields and values similar to those described below already exist in your database, please add these field and build amls or other macros to translate to the share codes. You can maintain the your data the way you want and translate for data sharing. We will share amls in the discussion area.

DATA STRUCTURE SUMMARY

The following is a summary of the data structure of the attributes beyond the dash ID field in a transportation .aat or related table.

Common Name	Item Name	Input Width	Output Width	Type

County FIPS Code	s_fips	5	5	N
County Identifier	co_unique	varies	varies	varies
Status	s_status	1	1	C
Date	s_date	8	8	D
Accuracy Statement	s_accur	2	2	I
Function	s_func	2	2	I
Agency Function	s_agfunc	2	2	I
Name	s_name	30	30	C
Surface Type	s_surf	3	3	I
Surface Width	s_surfwidth	6	6	N/2
Width	s_width	6	6	N/2
Jurisdiction	s_juris	3	3	I
Right Of Way	s_row	1	1	I
Access	s_access	15	15	C
Usage	s_use	10	10	C

COUNTY FIPS s_fips 5 5 n

There have been many debates and discussions regarding the Unique Identifier (S_UNIQUE) field. The initial definition included a portion that carries an 'Authority' identification, which was to be decided upon by the Federal Geographic Data Committee (FGDC). Without this authority identifier, populating the S_UNIQUE field is a moot point, and most, if not all counties have avoided it all together. In an attempt to remedy the situation, two new fields are now suggested to replace the original S_UNIQUE.

The first field is S_FIPS which is defined five digits numeric. It contains the state FIPS code of 49, and the appropriate county FIPS code.

For Utah, the State and county codes are as follows:

49001 - Beaver	49021 - Iron	49041- Sevier
49003 - Box Elder	49023 - Juab	49043 - Summit
49005- Cache	49025 - Kane	49045 - Tooele
49007 - Carbon	49027 - Millard	49047 - Uintah
49009 - Dagget	49029 - Morgan	49049 - Utah
49011 - Davis	49031 - Piute	49051 - Wasatch
49013 - Duchesne	49033 - Rich	49053 - Washington
49015 - Emery	49035 - Salt Lake	49055 - Wayne
49017 - Garfield	49037 - San Juan	49057 - Weber
49019 - Grand	49039 - Sanpete	

UNIQUE COUNTY IDENTIFIER co_unique varies

For GPS collected data, the need to uniquely identify the feature remains. A new field, using a county defined scheme and called CO_UNIQUE provides that function. Many counties currently have their own methodology or schema with which to identify features. For example, a Parcel-ID may have embedded within it coding that tells the Section, Township and Range the parcel is located in. This approach can easily be adapted to linear features such as roads and trails. On a purely conceptual basis, the CO_UNIQUE is populated with as much or as little information as defined by the individual county. For example, at least one county has developed a county-wide grid system, and the grid-cell identification number of the cell a given road is in would in part populate the CO_UNIQUE field. A very simple

approach to populating the CO_UNIQUE would be to use the data-base record number for the feature itself. This approach allows flexibility at the county level, as well as any other agency level. Depending on the county's identifier, the CO_UNIQUE can be defined as either numeric or character/string. If a county wants to incorporate a Section Township Range approach, the field would have to be defined as character/string to accommodate the STR designation.
The S_UNIQUE field will not totally be abandoned. It will be handled slightly differently. When data is submitted to the State Geographic Information Database (SGID), S_UNIQUE will be added and populated by concatenating The S_FIPS, S_JURIS (a numeric code which identifies the agency of jurisdiction), and the CO_UNIQUE. ***Any agency collecting data can use the CO_UNIQUE field to hold its identifier.***

STATUS s_status 1 1 Character

Unique identifiers are never reused. The purpose of this item is to track the status of the s_unique item *not the feature*!
P = Proposed
A = Active
R = Retired
Status is clearly useful for distinguishing proposed routes from existing ones. It is less clear how the retired status would be used. It suggests that arcs are never removed because they represent abandoned routes tracked for historical purposes.

DATE s_date 8 8 Date

Standard date format of yymmdd indicating the date when the data was collected or created. This is easily obtained when using a GPS to gather data in the field.

ACCURACY STATEMENT s_accur 2 2 Integer

Originally, this field was developed as a large character field, allowing text describing the accuracy level of the feature data. The City of Murray, Utah developed a two digit code which indicates not only the accuracy, but the methodology used to capture the data.
The first value (left side) of the number pair indicates how accurate the data source was for the feature, a value between 1 (most accurate or dependable) and 9 (least accurate or dependable). The second value (right side) of the number pair indicates whether the data was rubber-sheeted or transformed into the coverage, a value of 0 (not rubber-sheeted) or 1 (rubber-sheeted). Precision values are as follows:
9 - The feature was entered using COGO or survey accurate data of centimeter accuracy. [Added 2-2-00]
10 - The feature was entered using post-processed GPS resource grade data of sub-meter to 3 meter accuracy.
11 - The feature was entered using COGO or survey accurate data that was rubber-sheeted to a base map.
21 - The feature was digitized from an original engineering or architectural scaled drawing on vellum.
30 - The feature was entered as part of the original aerial base map creation process.
31 - The feature was digitized from an original engineering or architectural scaled drawing on paper.
41 - The feature was digitized from a copy of an engineering or architectural scaled drawing. Use this code for data captured by digitizing from a USGS quadrangle.
50 - The feature was collected from a digital orthophoto/drawing file.
51 - The feature was collected from a digital orthophoto/drawing file and rubber-sheeted to a base map.
61 - The feature was digitized from a rectified aerial photograph.
70 - The feature was entered based on data that was collected in the field (not surveyed).
71 - The feature was entered based on data that was collected in the field (not surveyed) and rubber-sheeted to a base map.
81 - The feature was digitized from aerial photos (not rectified).

90 - The feature was entered based on “best guess” data.
0 - no precision data exists for this feature
(With luck, values of 90 or 0 will not exist!)

FUNCTION s_func 2 2 Integer

These definitions were provided by the Utah Department of Transportation based on guidelines established by the Federal Department of Transportation. NDSI Ground Transportation Subcommittee provide their definitions. For now, the following definitions from Maricopa County, Arizona can be used. The term *Urban* is used in areas with a population of 5,000 or more.

1 - Rural Interstate
2 - Rural Principal Arterial
6 - Rural Minor Arterial
7 - Rural Major Collector
8 - Rural Minor Collector
9 - Rural Local
10 - Rural Trail
11 - Urban Interstate
12 - Urban Expressway
14 - Urban Principal Arterial
16 - Urban Minor Arterial
17 - Urban Collector
19 - Urban Local
20 - Urban Trail

Key points for Function

- Functional class as shown here is from a statewide view.

AGENCY FUNCTION s_agfunc 2 2 Integer

In testing the above functional class, we found that it didn't address local transportation management needs. For example, most roads on a Forest or State park may have a share.function of 9 but serve as an arterial or collector in the local transportation system. This *optional* field was added to give each jurisdiction the ability to further define their data.

10 - Arterial
20 - Collector
30 - Local
35 - Resource or special use; for example, a national park service road
40 - Trail

Key points for Agency Function

- The field was designed to meet local needs and it is fine to use local definitions for these values.

NAME s_name 30 30 Character

To facilitate building the route system over the arcs this field was included. To avoid splitting arcs just because the route number changes, this may have to be generalized at this level. This field can be populated as each agency decides what is best as long as the method is consistent within their data.

Examples:
Utah State Highway 10

FDR 2098
Horse Bench Road

Key points for Route Name

- Use the name by which you identify a road or trail and would like to show it on a map.
- A word of caution. Do not spell the routes inconsistently. If so spellings vary, building route systems based on the share.route, will be not work.

SURFACE TYPE s_surf 3 3 Integer

This field will eventually become part of the route system also. It may be generalized to avoid splitting arcs. Either use the general categories or the more specific sub categories if greater detailed is desired. Road or trail width is handled with an additional field.

100 - PAVED
110 - paved - concrete
115 - paved - Asphalt
120 - paved - Composite (ex. chip seal, tar sand)
200 - IMPROVED (suggests some form of maintenance and/or surfacing other than pavement)
210 - improved - aggregate/gravel undifferentiated (ex. gravel, pit run, or crushed aggregate)
211 - improved - crushed aggregate (no specifications identified)
212 - Improved - Specified aggregate (crushed to some specification)
213 - Improved - Pit run (taken from a borrow pit as is)
220 - Improved - chemical treatment undifferentiated (enzyme, oil, mag chloride, etc)
221 - Improved - oiled (different from paved - composite in that the surfacing is still represents unconsolidated materials
222 - Improved - enzyme
223 - Improved - mag chloride
300 - NATIVE
310 - Unimproved high clearance (rugged roads on native materials; usually requiring high clearance vehicles)
320 - Maintained native materials
400 - TRAILS undifferentiated
410 - paved trail
420 - gravel or aggregate trail
430 - native materials trail
440 - rugged trail (rough trail on native materials in rugged terrain)
999 - Undefined

Key Points for Surface Type

- Use the details only if you want to. The generalized values may be all your agency needs.
- Values between 100 and 399 are for roads.
- Values between 400 and 499 are for trails.
- The difference between a narrow road and wide trail is debatable.
- Choices here are best guess and clearly subjective.
- The Route Width field, shown below, will be used to better define width.
- Also, some debate exists whether a track or other unmaintained route is a road. This field is not intended to address administrative issues. It only describes the surface and general type of a road or trail.

SURFACE WIDTH s_surfwidth 6 6 2 (decimal places) (measured in decimal feet)

Width of traveled surface in feet. If the feature is paved or otherwise improved, (concrete, asphalt, graveled, oiled, etc)

the dimension from outer edge to outer edge of pavement or improved surface. If the feature is of native materials, the dimension measured from outer edge to outer edge of the traveled surface. In the case of a 'two track' the measured dimension of outer edge to outer edge of the tracks. The same would hold true for a trail; the measured width, edge to edge of the traveled surface.

WIDTH s_width 3 3 Numeric 2 (decimal places) (measured in feet)

The route width field provides for numeric width estimates defined as the width of distrubance. This will provide for a maximum value of 999.99 feet.
At one time, the Surface Type Codes implied width. Too many variations and lack of definitions led to the addition of this Route Width field. The Surface Type Codes still generally distinguish between roads and trails, but this field can be used define the 'gray areas' once adequate definitions become available.

Key points for Route Width

- Be accurate enough to estimate the vehicle width limitations of the route. For example, a trails with a width of 3 feet would not be suitable for four wheeled vehicles. An estimate of +- 2 feet would not be adequate in this case.
- The numeric 2 decimal place has been added for local agencies to have an accurate data collection method, but the two place decimal is not required for all entities.

JURISDICTION s_juris 2 2 Integer

This field defines who owns or maintains a particular road. This field could be generalized to avoid splitting arcs. The field has been revised to generally match the data structure of the CCP surface ownership codes.
100 - FEDERAL
  110 - BLM (Bureau of Land Management)
  120 - USFS (United State Forest Service)
  130 - NPS (National Park Service)
  140 - DOD (Department of Defense), Military or COE
  150 - BIA (Bureau of Indian Affairs)
  160 - USFW (United States Fish and Wildlife Service)
200 - STATE
  210 - State Department of Transportation
  211 - State Toll
  220 - State Park
300 - COUNTY
  310 - County Class B
  320 - County Class D
400 - CITY (not differentiated between city, municipality, town, etc.)
  410 - City Class C
500 - PRIVATE
600 - NATIVE AMERICAN
  610 - Native American Sovereign Nation (ex Navajo Nation)
700 - Disputed
999 - Unknown

Key points for Jurisdiction

- Jurisdiction in combination with State and County codes from the Unique identifier can be used to identify specific county jurisdictions.

- Another way to identify specific counties or cities is to intersect the data with the city and county layers from the SGID.

Right Of Way s_row 1 1 Integer

This item replaces the orginal share.rs2477 item, and now reflects the type of Right Of Way associated with the feature. The values here pertain to the State of Utah and may or may not apply in other states.
1 - Deeded. The right of way has been deeded and recorded as real property
2 - Prescriptive. (Utah Code 72-5-104 states " A highway shall be deemed to have been dedicated and abandoned to the use of the public when it has been continuously used as a public thoroughfare for a period of ten years.")
3 - Federal Land Policy Management Act (FLPMA) / Title 5
4- RS2477
5 - Other
Follow this link for more RS2477 specific information.

ACCESS s_access 15 15 character

This field defines access restrictions.
1 - Open - no special limitations or closures.
2 - Limited - prohibited activities or condition for closure. Put limitations in alpha order (i.e. 2es *not 2se*) if more than one limitation can applies

a – ATV	j - 4X4 (ex. Jeep)	s - seasonal snow closure*
b - bicycle (see also mechanized)	k - skate boards	t - 2 wheel drive (ex. sedan)
c - seasonal wildlife closure*	l - snow machines (ex snow mobiles)	u - vehicle size (unspecified)*
d – dogs	m - motorized vehicles	v - vehicle weight*
e - equestrian	n -	w - vehicle height*
f - short term weather closure* (ex. known flash flood area)	o	x - vehicle length*
g -	p - pedestrians and hikers	y
h - snow shoers	q -	z - mechanized (ex. bicycle, roller blades, skate boards, etc.)
i – skiers	r- roller blades	

** Contact Jurisdictional entity for specifics*

examples 2mz - typical wilderness trail 2f - The road up Little Cottonwood Canyon (avalanche closures). 2s - A highway closed in Winter. 2cl - A snow covered trail with seasonal wildlife closure and prohibition of snowmobiles. 2hi - A snow covered trail set aside for snowmobile use in an area where skiers/snowshoers and snowmobilers have specified areas. 2dhm - A groomed cross country ski trail. 2edpq - An ATV trail where non-motorized uses are prohibited to avoid accidents.

3 - Closed
d - Administrative use only
r - to be Reclaimed
(When a feature has a value of three, both the *d* and *r* categories take on these special meanings, rather than having a *dogs* or *roller blade* restriction)
4 - Abandoned
5 - Disputed
99 - Unknown

USAGE s_use 10 10 character

Identifies primary use or management objective of a road or trail, not restrictions.

a - ATV
b - Bicycling (bike trail) - see also m
c - motor cycle
e - equestrian/horseback riding
f - foot/Hiking
h - Handicap accessible
i - interpretive
k - cross country skiing
o - OHV
m - Mountain Biking
s - Snowmobile

Key Points for Usage

- The usage code is to be applied to roads and trails that have specific management objectives. It does not need to be applied to every road and trail.
- This item is a handy attribute when creating a use map such as snowmobile, hiking or other recreation uses.

Current projects using the CCP share codes for data attributing

Utah Transportation Data Model
Washington County Roads Projects

RS2477 road data links *(not responsible for content of web sites, for your info only)*
Western Counties
Southern Wilderness Alliance
Public Access Home Page
US House of Representatives
Salt Lake Tribune 1996
Salt Lake Tribune 1997

Definitions as adapted from Webster's II New College Dictionary

Aggregate

Arterial major transportation route from which other routes branch

Asphalt a brownish - back mixture of bitumen's obtained from natural deposits or as a petroleum by product, used in paving, roofing and water proofing; a mixture of asphalt and gravel or sand used for paving

Bitumen's any various mixtures of hydrocarbons and other substances occurring naturally or coal petroleum

Collector

Composite made up of distinctly different parts or elements; complex material

Concrete a building material made of sand pebble, crushed stones , etc. held together by a mass of cement or mortar

Enzyme

Expressway multilane highway designed for fast travel

Highway a main public road, sep. one that connects towns and cities

Interstate of, between, or connecting two or more states

Jurisdiction The right and power to interpret and apply the law; Authority or control

Local of a limited area or space; (local government), making many stops; not express

Municipal of, or relating to, or typical of a municipality; having local self-government

Paved to cover with a hard smooth surface for travel

Rural Of, in or pertaining to the country as apposed to the city; of or related to agriculture

Sovereign Nation a self-governing, independent geopolitical unit

Town An often incorporated population center larger than a village and smaller than a city.

Trail to bring gradually fainter; path left by a moving body; a blazed path or beaten track

Urban of ,located in , or constituting a city. Characteristic of the city or city life

Appendix 5.

CCP CADASTRAL SHARE CODES

SURVEY.COMPL
Indicates whether the section has been surveyed.

YES Section fully surveyed
NO Section not surveyed
PARTIAL Section has partial survey data

SURVEY.RISK
Indicates the level of risk in using lines based on less than fully reliable survey data.

LOW No obvious risks in using less than fully reliable survey data. Example: Public lands without sensitive common boundaries such as National Park or Private Land.
MODERATE Moderate risk in using less than fully reliable survey data. Example: Public lands without sensitive common boundaries such as National Park or Private Land.
HIGH High risk in using less than fully reliable survey. Example: Public lands bordering on private land, National Park lands, or Designated Wilderness.

CORNER.TYPE
Indicates the type of corner.
Identical field definition to that in GCDB

PLSSID 11 I?
Concatenation of Quadrant, Township, Range, and Section. Used also to link to detailed survey data as in GCDB.

RELIABILITY
Reliability of survey for the section.

RELIABLE Section lines are based on reliable survey data.
UNRELIABLE Section lines are based on unreliable survey data.
UNKNOWN Reliability of section lines is unknown.

CONTROL
Indicates whether survey point is calculated or a control point (found corner).
Identical field definition to GCDB.ID from GCDB.

CONTROL Coordinate is a surveyed control point.
CALCULATED Coordinate is calculated form record information adjusted against known control.

CCP SURFACE OWNERSHIP SHARE CODES

SHARE.SURF_OWN 3 I
Surface ownership.

100-199 Federal
200-299 State
300-399 County
400-499 City
500-599 Private
600-699 Indian
700-799 Other

SHARE.MIN 3 C
Mineral rights.

all all minerals
alc all except coal
coa coal
og oil and gas
os oil shale
tsa tar sands
pot potash
pho phosphate
sod sodium
geo geothermal
sal salable
loc locatable
oth other

SOURCE

ALTERNATE NON-RELATIONAL SYSTEM CURRENTLY USED IN Grand Staircase – Escalante National Monument

CODE 3 I

101 Full State mineral rights
102 Partial State mineral rights
103 Full Federal mineral rights
104 Private patent (oil-gas-coal)
105 Private patent (all minerals)
106 Private patent (coal)
107 Partial State – Federal coal only
108 Partial State – Federal oil & gas
109 Partial State – Federal oil-gas-geothermal

110 Private patent (oil & gas)
111 Combine 102 & 107
112 Combine 102 & 109
113 Combine 101 & 107

Appendix 6.

Status of FGDC Standards
as of March 19, 2000

Final Stage - FGDC Endorsed Standards

Content Standard for Digital Geospatial Metadata (version 2.0), FGDC-STD-001-1998

Content Standard for Digital Geospatial Metadata, Part 1: Biological Data Profile, FGDC-STD-001.1-1999

Spatial Data Transfer Standard (SDTS), FGDC-STD-002
(a modified version was adopted as ANSI NCITS 320:1998)

Spatial Data Transfer Standard (SDTS), Part 5: Raster Profile and Extensions, FGDC-STD-002.5

Spatial Data Transfer Standard (SDTS), Part 6: Point Profile, FGDC-STD-002.6

SDTS Part 7: Computer-Aided Design and Drafting (CADD) Profile, FGDC-STD-002.7-2000

Cadastral Data Content Standard, FGDC-STD-003

Classification of Wetlands and Deep Water Habitats, FGDC-STD-004

Vegetation Classification Standard, FGDC-STD-005

Soils Geographic Data Standard, FGDC-STD-006

Geospatial Positioning Accuracy Standard, Part 1, Reporting Methodology, FGDC-STD-007.1-1998

Geospatial Positioning Accuracy Standard, Part 2, Geodetic Control Networks, FGDC-STD-007.2-1998

Geospatial Positioning Accuracy Standard, Part 3, National Standard for Spatial Data Accuracy, FGDC-STD-007.3-1998

Content Standard for Digital Orthoimagery, FGDC-STD-008-1999

Content Standard for Remote Sensing Swath Data, FGDC-STD-009-1999

Utilities Data Content Standard, FGDC-STD-010-2000

Review Stage

Completed Public Review

Facility ID Data Standard

Geospatial Positioning Accuracy Standard, Part 4: Architecture, Engineering Construction and Facilities Management

Content Standard for Framework Land Elevation Data

Metadata Profile for Shoreline Data

Hydrographic Data Content Standard for Coastal and Inland Waterways

Digital Geologic Map Symbolization

Geospatial Positioning Accuracy Standard, Part 5: Standard for Hydrographic Surveys and Nautical Charts

Out for Public Review
Note: "(month date, year)" indicates closing date for public review.

Address Content Standard (closes June 22, 2001)

NSDI Framework Transportation Identification Standard (closes July 20, 2001)

U.S. National Grid for Spatial Referencing (closes June 22, 2001)

In Review by SWG Prior to Public Review

Content Standard for Digital Geospatial Metadata: Extensions for Remote Sensing Metadata
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Draft Stage

Earth Cover Classification System

Encoding Standard for Geospatial Metadata

Geologic Data Model

Governmental Unit Boundary Data Content Standard

Biological Nomenclature and Taxonomy Data Standard

Proposal Stage

National Hydrography Framework Geospatial Data Content Standard

National Standards for the Floristic Levels of Vegetation Classification in the United States: Associations and Alliances

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Discontinued from FGDC Standards Process

Metadata Profile for Cultural and Demographic Data (draft stage)
Environmental Hazards Geospatial Data Content Standard (draft stage)
Transportation Data Content Standard (proposal stage)

FGDC, USGS, 590 National Center, Reston, VA 20192
URI: http://www.fgdc.gov/standards/status/textstatus.html